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ENVIRONMENTAL ASSESSMENT · GENERAL MANAGEMENT PLAN · DEVELOPMENT CONCEPT PLAN ·

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DEVILS TOWER NATIONAL MONUMENT
Wyoming

National Park Service   Rocky Moutain Region

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ENVIRONMENTAL ASSESSMENT/GENERAL MANAGEMENT PLAN

DEVELOPMENT CONCEPT PLAN

For

Devils Tower National Monument
Crook County
Wyoming

National Park Service
United States Department of the Interior

DRAFT

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SUMMARY OF PROPOSED PLAN

The proposed plan responds to resource protection, park management, and visitor use needs. By providing facilities and programs oriented to various visitor activities, environmental awareness is increased and incidental resource damage is decreased. New and rehabilitated facilities will lessen time required for maintenance and cleanup activities. Overcrowding of the current visitor center and its auxiliary facilities is minimized by construction of a new visitor/administrative building.

New or improved facilities and services provided by the proposed plan include:

- Chip and seal of periphery gravel roads
- Expand parking capacities at the Prairie Dog Town and picnic area
- Improve interpretive exhibits and waysides
- New 6,700-square-foot visitor/administrative facility
- Partially reconstruct Tower Trail
- Construct an additional National Park Service duplex
- Expand sewage treatment facilities
- Expand water storage and distribution system
- Improve natural resource management programs
- Improve museum collection storage facilities
- Improve archival/library management facilities
- Action to nominate sites for the National Register of Historic Places
- Improve and expand interpretive programs
- Improve warning systems and devises to warn visitors and park staff of potential flood hazards
- Modify facilities for use by the physically disabled.

CHAPTER I

PURPOSE AND NEED FOR THE PLAN

INTRODUCTION

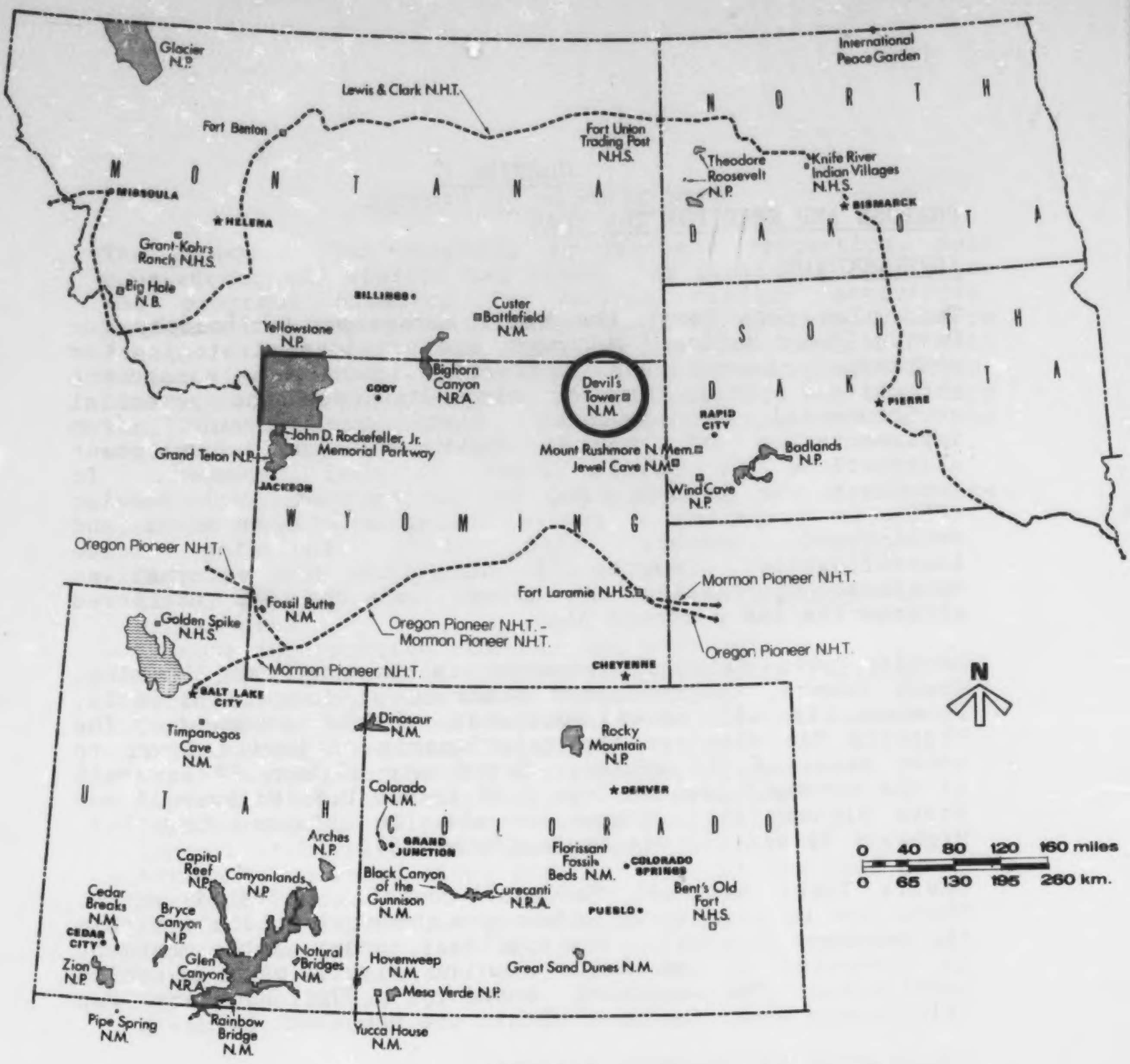
This plan sets forth the basic management philosophy for Devils Tower National Monument and provides strategies for addressing issues and achieving identified management objectives. This document also discloses the potential environmental consequences that may result from implementation of various management and development alternatives at Devils Tower National Monument. It documents the process used by the National Park Service (NPS) in preparing a general management plan (GMP) and development concept plan (DCP) including issue identification. Chapter II identifies the alternatives developed to resolve the issues and the NPS preferred alternative and proposed plan.

Devils Tower National Monument is in northeast Wyoming, Crook County, Congressional District at Large. Gillette, Wyoming, is 105 miles southeast of the monument. The Vicinity Map displays the relationship of Devils Tower to other areas of the region. Interstate Highway 90 is south of the monument; access from I-90 is via U.S. Highway 14 and State Highway 24. Access can also be obtained from U.S. Highways 85 and 212 via State Highway 24.

Devils Tower National Monument contains 1,346.91 acres. There are no private or other government inholdings within the monument boundary. The southeast corner of the monument is traversed by the Belle Fourche River, part of which constitutes the monument boundary. The Boundary Map illustrates other features within the monument.

LEGISLATIVE AND PLANNING HISTORY

Devils Tower National Monument, the first national monument, was established by Presidential Proclamation 658, September 24, 1906. The Act of August 9, 1955, (69 Stat. 575) adjusted the boundaries of Devils Tower National Monument (see Appendix A - Legislation). The monument does not presently have a GMP. The area is managed on an interim basis in accordance with the monument's statement for management. An interpretive prospectus was approved for the area on October 4, 1979, and a resource management plan--natural component--was approved on June 27, 1983, and the cultural component was approved on January 28, 1985.



MAP I.1

ROCKY MOUNTAIN REGION

National Park Service

United States Department of the Interior

Legend

- • Locations of Major Cities
- ★ Locations of State Capitals
- ┆ State Boundary Lines
- ▨ National Park Service Areas
- ----- National Park Service Historical Trails

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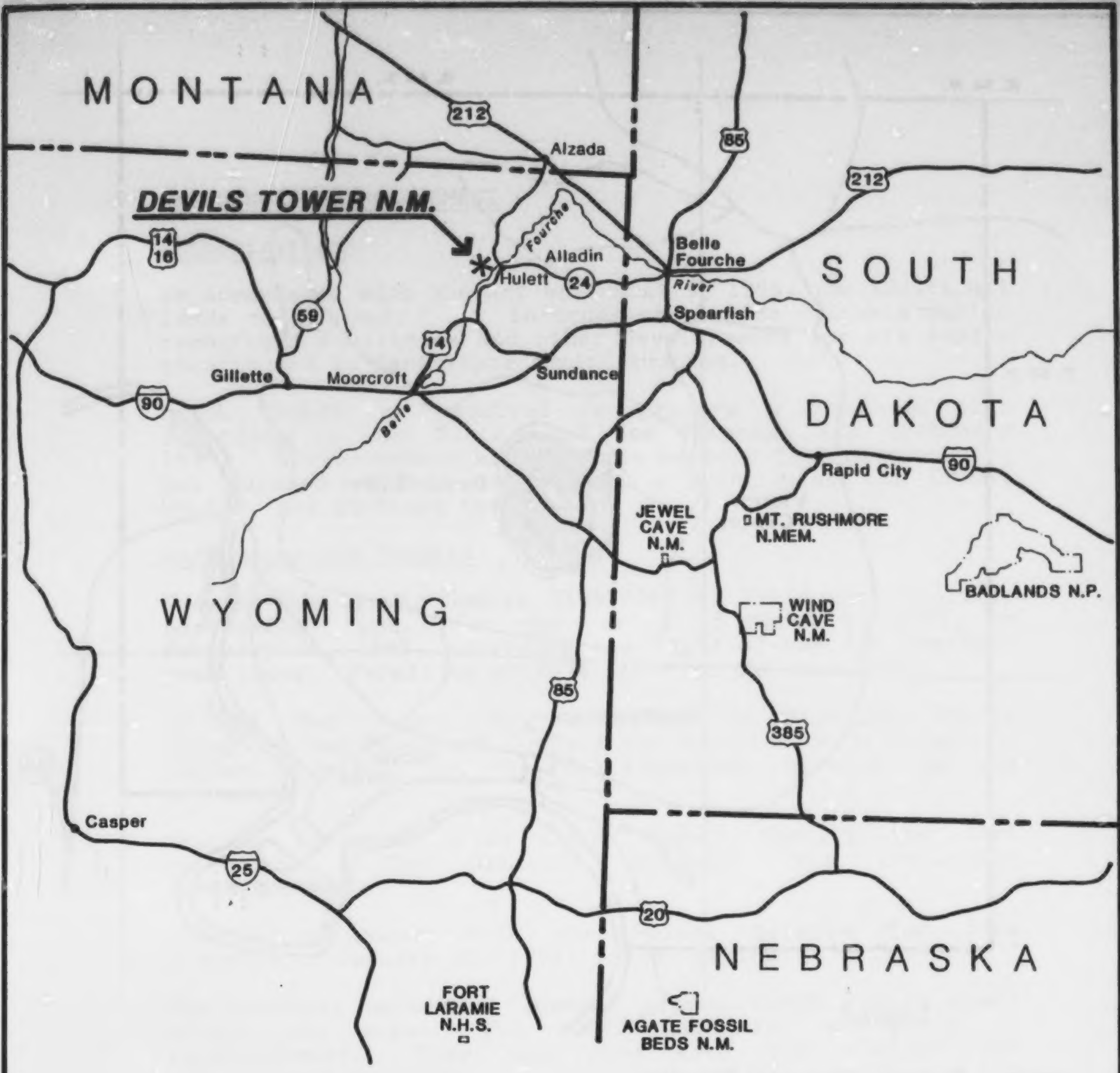

MAP I.2

Vicinity Map

Devils Tower National Monument

United States Department of the Interior - National Park Service

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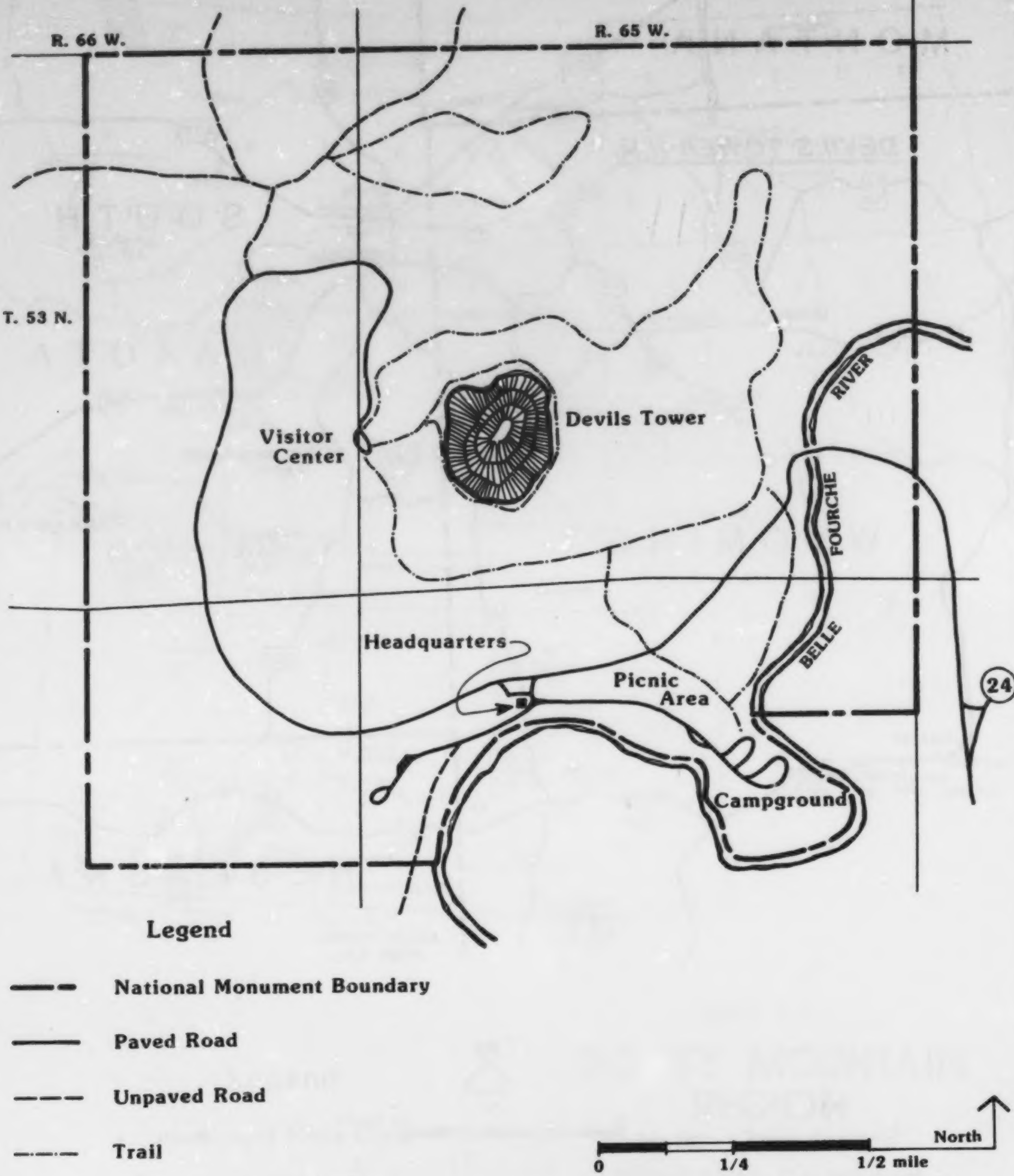

Map I.3

Boundary Map

Devils Tower National Monument

U.S. Department of the Interior - National Park Service

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July 85 | RMRO

INFLUENCES ON MANAGEMENT

Authorizations

In accordance with the Act of August 9, 1955, the additional lands to be used, ". . .in order to provide suitable public campground facilities and other developments for the public benefit and to facilitate administration. . .."

Crook County is required to prepare a land-use plan according to the State Land Use Planning Act (February 1975). A nine-member board, three members from each county, has pursued efforts to prepare a joint plan for Crook, Weston, and Niobrara Counties.

Agreements and Permits

Special Use Permit Number 2109-0002 to Tri-County Electric Association, Inc., for the period of March 1, 1971, to February 28, 1991, providing for right-of-way for overhead powerlines. Permit to provide power to the monument.

Special Use Permit No. 2109-0001 to Mountain States Telephone and Telegraph Company for maintenance of telephone cables. Permit to provide telephone service to the monument.

Written agreement with Crook County Sheriff for fire protection. The national monument has concurrent jurisdiction.

Written agreement with the Forest Service for fire protection, January 15, 1984, 5-year period.

The monument maintains several gravel ranch access roads within the area. The roads were in use prior to establishment. They are also used for visitor and administrative access.

There is a 50-foot wide stock access lane along the southeast corner of the boundary to water (river) for private livestock.

About 85 percent of the Belle Fourche River has been adjudicated for South Dakota. Nearly all of the remainder has been purchased by Wyoming ranchers. Little, if any, remains unallocated.

Devils Tower Natural History Association provides sale of books, geology slides, geology maps, and miscellaneous pertinent monument related items. This is a nonprofit organization, and proceeds are used for enhancement of interpretive activities at Devils Tower. The History Association annually donates books to the park library.

PARK PURPOSE AND MANAGEMENT OBJECTIVES

To preserve and provide for the use of Devils Tower ". . .a natural wonder and an object of historic and great scientific interest. . .."

Proclamation (No. 658--September 24, 2906--Stat. 3236)

The above purpose is based on the following relevant portion of the proclamation establishing Devils Tower National Monument.

> And, WHEREAS, the lofty and isolated rock in the State of Wyoming, known as the Devils Tower, situated upon the public lands owned and controlled by the United States is such an extraordinary example of the effects of erosion in the higher mountains as to be a natural wonder and an object of historic and great scientific interest and it appears that the public good would be promoted by reserving this tower as a national monument with as much land as may be necessary for the proper protection thereof.

The purpose also relates to an act dated August 9, 1955, ". . .and in order to provide suitable public campground facilities and other development for the public benefit. . .."

Devils Tower is a high, isolated monolith of igneous rock, with remarkably symmetrical joint columns, set upon a pine-clad pedestal of colorful sedimentary shale and sandstone and located within a gracefully meandering bend of the Belle Fourche River. The tower is a unique example of landscape forms which owe their existence to volcanic intrusion and subsequent erosion. The unusual character of this peculiar landform and its superbly aesthetic aspect was recognized long ago when it was established as the first national monument on September 24, 1906.

As identified in the Natural Park System Plan, Devils Tower is in the Great Plains physiography region. The National Park Service theme is "Works of Volcanism." The monument gives fairly good representation to this theme although the volcanic feature is not typical of volcanic phenomena of the Great Plains.

Management objectives outlined in the current statement for management are as follows:

- To identify, evaluate, protect, and interpret the park's natural and cultural resources on a year-round basis.

- To ensure--through cooperation with other agencies, organizations, and groups--that land and water uses in the park's vicinity are compatible to the greatest possible degree with the purposes of the park.

- To maintain cooperation with other interests in developing land management programs in the park and its vicinity with respect of law enforcement, noxious weed control, fire protection, water quality, solid waste disposal, and other appropriate activities.

- To maximize alternative energy sources and techniques in the maintenance and development of the monument.

- To foster appreciation and understanding of geological resources and to provide supplemental interpretation of cultural and other natural resources.

- To increase visitor awareness of the inherent hazards associated with climbing and other activities within the monument and to provide for the fullest possible visitor safety.

ISSUES

The following issues were identified by the public, the National Park Service, and other government Agencies during a scoping and public involvement program begun in March 1935. They represent the concerns or problems that individuals or groups have expressed to date regarding the future of Devils Tower National Monument. This planning effort responds to those concerns. As new issues are identified during the planning process, they will be added to this list.

a. Visitor Contact, Administration, Employee Housing, and Maintenance

Constructed in 1935, the 1,400-square-foot visitor center--of which 904 square feet is available to the visitor--does not appear adequate to accommodate the 2,000-plus persons which visit the facility each day during the peak-use season. Currently, the visitor center is open from May through October 31. Complete visitor services and interpretation are not available during the rest of the year.

Respondents to the scoping effort indicated the visitor center has been outgrown, and a facility which is more modern with provisions for the physically disabled is needed. These respondents also indicated a need for expanded parking and "out-of-sight" bus and recreation vehicle parking. Some respondents felt the visitor center should be relocated near the entrance.

Because of potential flood hazards, some respondents felt the maintenance and residential areas should be relocated to the Red Beds area. Other comments stressed the need for facilities that emphasized energy efficiency and minimized cleanup and routine maintenance work.

b. Interpretation, Trails, and Rock Climbing

An interpretive prospectus and exhibit plan have been developed; however, these plans have not been fully implemented. One paved trail is provided at the monument. Because of steep slopes and narrow widths, this trail is not usable by the physically disabled. The collection of pine needles and sand on the trail's hard surface creates slippery conditions. Due to low staffing levels, maintenance of these areas is difficult. Some respondents indicated a need for a shorter trail that provided views and interpretation of Devils Tower.

Climber safety is a paramount concern. Programs to maintain safety must continue. A need to establish tower capacity for climbers was also identified to minimize climber conflicts and to prevent degradation of the view of the tower for nonclimbers.

c. Roads and Parking

A 1980 Federal Highway Administration (FHWA) survey identified a structural sufficiency rating of 56.3 and a safety sufficiency rating of 68.4 indicating poor conditions on the main park road. During the high-use season, traffic is slow. Reconstruction of this road has been programmed. This improvement must be recognized in the general management plan. Because parking lots are full, visitors often enter and leave the park without seeing the resource. There is a need to analyze parking needs to serve the various activities within the park.

d. History and Archeology

Not all data necessary to provide protection of historical and archeological resources is available. There is a need to collect necessary data and to implement appropriate protection programs.

e. Resource Management, Floodplain, Water Rights, and Water Resource Management

There is a need to evaluate and identify the following resource management information (1) significance of the resources relative to the park purpose, (2) elements that pose a threat to the natural or cultural resources, (3) those elements that constitute the historic theme, (4) water resource management needs, (5) floodplain levels and effects on existing developments, and (6) provisions necessary for visitor and staff protection in the event of failure of the Keyhole Dam.

f. Operations, Personnel

Many of the above issues are directly related to inadequate staffing levels. Maintenance of structures is not performed on a cyclic basis, visitor safety is threatened through fire danger created by fuel buildup, and lack of weed control in the amphitheater serves unwelcome wildlife such as skunks, rattlesnakes, and porcupine.

Because interpretive personnel are not readily available, visitor experience is diluted. Many information gaps about the monument remain, because staff levels are not adequate to conduct necessary research and inventories.

CHAPTER II

THE PROPOSAL AND ALTERNATIVE ADDRESSING THE ISSUES

A. INTRODUCTION

The proposal presented in this chapter constitutes the Park Service's proposed General Management Plan and the Development Concept Plan for Devils Tower National Monument. Other alternatives were developed to address the issues in various ways, they are also displayed in this chapter. The alternatives have different emphases. Consequently, each provides a different response to the issues. In addition to the National Park Service Proposal, four alternatives were developed for Devils Tower National Monument, this includes the minimum management and no action alternative reflected by existing conditions.

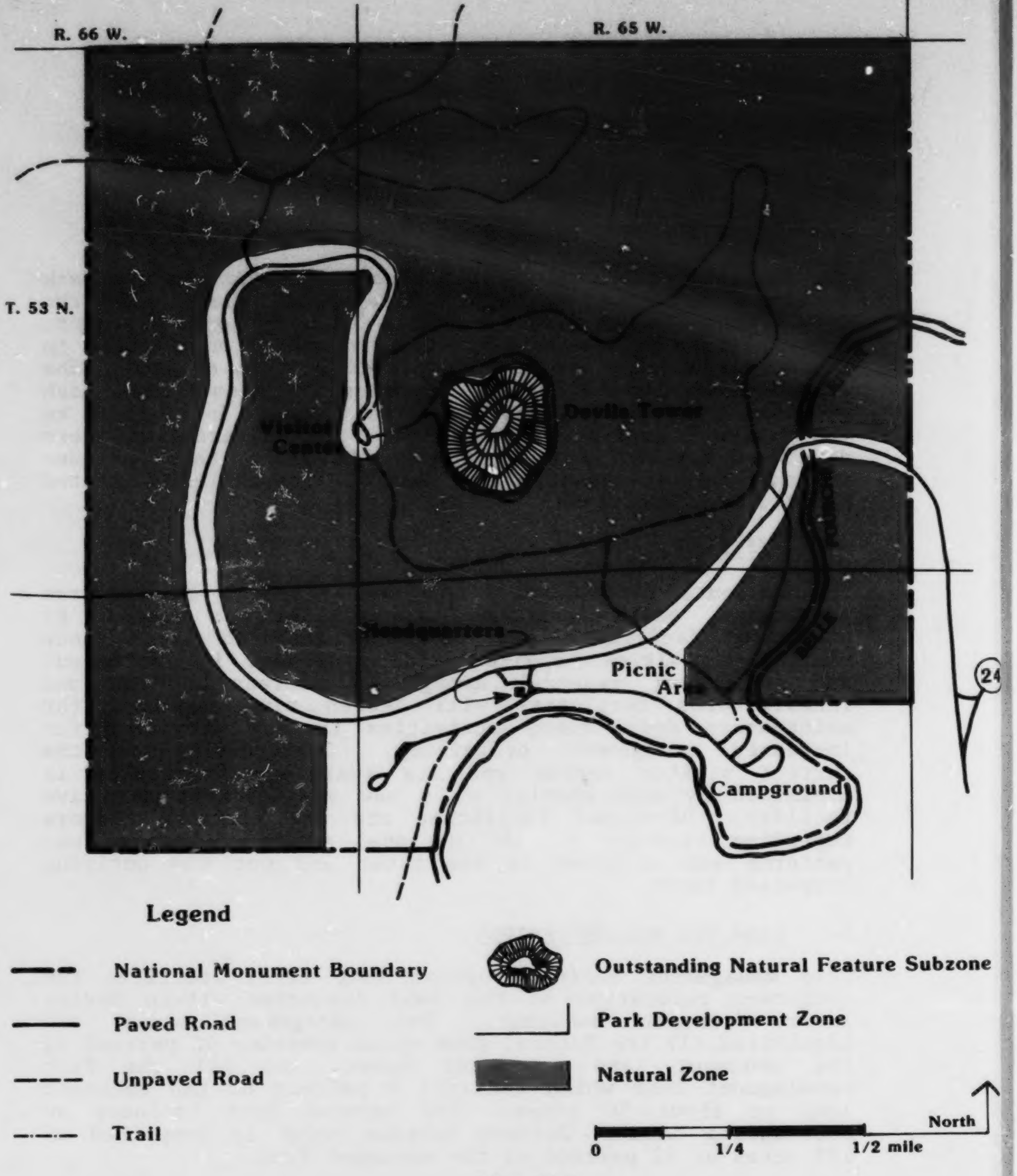
B. THE PLAN

The National Park Service proposal responds to resource protection, park management, and visitor use needs. By providing facilities and programs oriented to various visitor activities, environmental awareness is increased, and incidental resource damage is decreased. New and rehabilitated facilities will lessen time required for maintenance and cleanup activities thereby providing for increased management efficiency. Overcrowding of the current visitor center and its auxiliary facilities is minimized by construction of a new visitor/administrative facility. Developed facilities are the limiting factors regarding capacity of the national monument because use patterns are oriented to the tower and not the outlying dispersed lands.

1. Land Use and Management

This management zoning proposal (Map II.1) specifies the long-term allocation of the land resources within Devils Tower National Monument. Two management zones are identified (1) the Natural Zone which contains 96 percent of the monument land or 1,297 acres, and (2) the Park Development Zone which contains 4 percent of the monument land or about 50 acres. The Natural Zone includes an Outstanding Natural Feature Subzone which is comprised of 155 acres or 12 percent of the monument land.

Within the Natural Zone are pine forest communities surrounding the tower base, riparian vegetative communities associated with the Belle Fourche River and its floodplain, upland prairie remnants between the river and tower, prairie dog colonies, and habitat for various wildlife species.



Map II.1

Proposed Management Zoning

Devils Tower National Monument

U.S. Department of the Interior - National Park Service

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Devils Tower itself, a high isolated monolith of igneous rock with remarkably symmetrical joint columns, comprises the Outstanding Natural Feature Subzone.

The Park Development Zone includes the main access road, entrance station, parking, picnic area, amphitheater, campground, administrative and maintenance facilities, employee residential area, and tower-base facilities.

Management emphasis within the Natural Zone is directed towards conservation of natural resources and processes and accommodation of uses that do not adversely affect these resources and processes. Management emphasis within the Outstanding Natural Feature Subzone includes special management concerns as related to preservation of the tower and its related values while providing safe, technical rock climbing opportunities.

Management within the Park Development Zone includes strategies necessary to provide and maintain developments that serve the needs of the visitor and park management. All historic structures are located in this zone with the exception of the historic ladder, which is within the Outstanding Natural Feature Subzone.

Devils Tower's 1,347 acres is surrounded entirely by private lands. These lands have been developed with roads, residences, and extensive agricultural improvements. Viewsheds within natural zones include these private lands. Because of the evidences of man's culturally modified environment and the small size of the natural zones, there is no potential for the visitor to experience primitive, unconfined recreation and solitude. Needs will continue to exist for management of the pine beetle to protect ponderosa pine stands and management of noxious weeds. For these reasons, the natural zones of the national monument do not qualify for wilderness designation.

2. Resource Management

Following are the resource management strategies needed to protect, preserve, and perpetuate the monument's natural and cultural resources for the next 5 to 10 years. A Natural Resources Management Plan was approved for Devils Tower in June of 1983. A Cultural Component of the Resource Management Plan was approved January 28, 1985.

a. Natural Resources

(1) Exotic Plant Management: Fifty exotic plants have been identified within the monument. Most are not common and are scattered throughout the monument; however, leafy spurge and, to a lesser extent, Canada thistle occur in extensive stands. These two species are aggressive and threaten other vegetation. Past practices have reduced amounts of leafy spurge by about 90 percent.

Exotic plant management strategies proposed at the monument include:

- Selectively spray individual leafy spurge plants on an annual basis
- Maintain cooperation with adjacent landowners, county, and State Agencies involved in noxious weed control
- Continue to use park staff to monitor the extent of leafy spurge and Canada thistle
- Develop a monitoring program for other exotic species in the monument
- Cooperate with researchers on the use of biological control agents (such as, flea beetle, gold midge). There is a need to develop biological controls for a number of exotic plants, particularly leafy spurge and Canada thistle.

Fire Management: Ponderosa pine forests cover about 750 acres of the monument. Historically, fire suppression--combined with grazing by livestock--has resulted in large accumulations of fuel. Fire suppression has permitted unnatural thickening and spreading of Ponderosa pine, invasion of exotic plants, and decadence of pine stands.

Because of the relatively small size of the monument, the danger of escaped wildfire from unnatural fuel buildup necessitates a continuing program of fire management including:

- Burn plots of ponderosa pine as funding permits
- Use previous burns as a data base; develop specific burning prescriptions for future use

Maintain a master map of the burning program

Continue pre- and post-burn photo plot establishment

Complete fire history research and incorporate data into the prescribed burning program.

Prairie Dog Management: The monument contains one prairie dog town of about 40 acres and an estimated 2,000 animals. The prairie dogs invade the monuments' picnic area and campground. They also invade adjacent lands causing landowner complaints. Because of its proximity to the entrance road, visitors feed the animals in spite of various messages not to. To ensure public health and safety, some separation from humans and human food is essential because prairie dogs may carry fleas which spread bubonic plague and other diseases.

Strategies necessary to control prairie dog populations include:

Annually monitor prairie dog populations and signs of town expansion and selectively remove prairie dogs as needed

Continue to warn visitors against feeding prairie dogs through signing, personal contacts, and brochures.

Animal Pest Management: There are occasional pests such as feral cats and dogs, wasp nests, and pack rats within the monument. Feral pigeons have been known to roost on the tower whitewashing the tower and creating a hazard to climbers; however, pigeons have not been sighted since November 1984.

Needed animal pest management strategies include:

Monitor for pests on a continuous basis

Removal, as needed, of feral cats and dogs, wasp nests, and pack rats

Contact the U.S. Fish and Wildlife Service regarding a joint pigeon management program if the species returns and creates a problem

Research population control techniques for feral pigeons if the species return and create a problem.

Tree Maintenance and Restoration: Trees in public-use areas die of old age and are killed by lightning, beetles, and visitor use. Standing dead trees are a hazard to visitors and public and private property. Large cottonwood stands are becoming decadent along the river floodplain.

Vegetative management strategies necessary to ensure perpetuation of trees in problem areas and to provide for public safety include:

Continued monitoring and removal of hazardous trees in developed areas

Initiate a study to determine the causes of riparian forest decadence, and develop strategies necessary to correct the situation

Initiate a native tree planting program to replace losses in visitor-use areas.

White-tail Deer Management: Populations of white-tail deer use the monument. This population is not resident within the monument, but uses adjacent lands heavily. Population levels have remained fairly constant over the past 10 years; although, they are artificially maintained by agricultural practices on adjacent lands. Occasionally, farmer complaints of deer depredation have resulted in special hunts and payment of deer damage by the Wyoming Game and Fish Department (WGF). WGF considers these hunts only partially successful because deer are pushed to the monument where hunting is prohibited. Over browsing by deer does appear to be a serious problem. Browse condition and trend is occasionally monitored by the park staff and WGF.

White-tail deer management strategies necessary for protection of resources at the monument include:

Maintain hunting and boundary controls during the hunting season

Cooperate with the Wyoming Game and Fish Department within the constraints of National Park Service policy

Annually monitor deer population levels

On an ocular basis monitor browse conditions and trends

Use photo points of browse plots for comparison of browse conditions.

Beaver Management: Beaver populations occur within and out of the monument along the Belle Fourche River. Beaver populations increase every 5 to 6 years causing extensive damage to trees along the Belle Fourche floodplain. Beaver damage of cottonwood is resulting in a quick decline of cottonwood populations.

The following strategies are necessary to achieve productive harmony between beaver and the need to sustain cottonwood populations.

Maintain fencing of individual trees for protection from beaver damage

On a semiannual basis, monitor the extent of beaver damage to trees

Study the beaver/floodplain/forest ecology to more adequately assess the situation and provide management strategies.

Unique, Rare, and Endangered Species Management: The monument is within range of the black-footed ferret; however, the species is not known to exist here. Surveys for the black-footed ferret were completed in the 1960's and 1970's. In the winter, bald eagles are frequently observed although they are not known to nest here. The Wyoming Game and Fish Department has identified the tower as a potential peregrine falcon hacking site; however, it was believed visitor use was too high to develop a viable program. Prairie falcons have been known to nest on the tower and prey on pigeons. The occurrence of rare and endangered plants in the monument is presently unknown.

The following management strategies are necessary:

Continue to close climbing routes in the vicinity of the prairie falcon as needed

Survey the monument for possible rare and endangered plants

Continue to monitor for unique, rare, and endangered species and continue observation records

Develop and implement protection and enhancement plans for unique, rare, and endangered species if their occurrence becomes known

Conduct baseline inventories to identify unique, rare, and endangered species.

Boundary Control: Standard National Park Service boundary signs and 8 miles of fence mark the monument boundary. The fence is maintained by adjacent landowners.

Patrols are used to determine adequacy of boundary markings. When fence breaks occur, livestock enter the monument and adjacent landowners are notified to remove the livestock. Management strategies necessary at the monument are:

Continue boundary patrols by park staff

Maintain the cooperative National Park Service/adjacent landowner fence maintenance and livestock removal program.

Air Quality Management: Devils Tower is designated as a Class II clean air area under 1977 Clean Air Act Amendments. Air quality monitoring has been conducted at the monument since May 1976 as part of the State of Wyoming's monitoring network. Pollutants monitored included sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter. However, since SO_2 and NO_x concentrations were at or below detectable levels, the State discontinued monitoring for those pollutants. Particulate matter concentrations had shown a slight increase until the past 2 years when they began to decrease. At present, the air quality within the monument is pristine.

In 1980, the Department of the Interior determined that the air quality related values (including visibility, flora, fauna, and cultural resources) of the monument were important assets of the area and recommended that the monument be redesignated to Class I status. To date, the State of Wyoming has taken no action on this recommendation.

The region and other interested parties should be informed of air quality trends in the monument.

Air quality should continue to be monitored.

Basic Natural Resource Inventories: To make better management decisions, there is a need to know more about the basic resources of the monument. Geology is the main interpretive theme of the monument. Geologic studies completed so far seem to be adequate for this purpose. Natural history checklists have been developed for birds and plants. A vegetative cover map for the monument was completed in the mid-1930's. As funding permits, there is a need to:

Develop an updated vegetative and habitat type map

Conduct detailed surveys on distribution, composition, and density by vegetation type for birds, mammals, amphibians and reptiles, and invertebrates

Conduct detailed surveys on composition and densities of fish.

Pine Beetle Management: Black Hill pine beetle infestations have occurred in the 750 acres of ponderosa pine since the monument was established. About 120 trees per year were being killed in the 1960's. Chemical spraying was initiated and loss was reduced to 12 trees per year. At the present time, it is estimated that 5 to 10 trees per year are killed by bark beetle. The beetle infestation is not considered to be a threat to adjacent landowners.

Following are the proposed management actions:

Monitor pine beetle within the monument to ascertain the levels of activity

Allow pine beetle infestations to exist unimpeded unless they threaten adjacent lands

If threats do occur, trees should be felled and the bark burned. This program will be coordinated with the fire management program.

Water Resource Management: The Belle Fourche River flows through the monument for about 1/2 mile. Its flow is controlled by the Keyhole Dam about 17.8 floodplain miles upstream. Water quality is unknown. As part of this general management plan process, the 100- and 500-year flood-frequency levels have been determined. The National Park Service will:

Develop a water resource management plan that addresses water resource problems

Evaluate the Bureau of Reclamation's upcoming Emergency Preparedness Plan for Keyhole Dam and determine adequacy of warning devises and procedures.

Cultural Resources

Maintenance of the Monument's List of Classified Structures' (LCS) Properties: In addition to the tetrahedrons and historic ladder, four structures (visitor center, residence, checking station, and fire-hose shed) were built by the CCC and related New Deal agencies in the 1930's. Since then, the interiors of most of these buildings have been modified, but the exteriors remain similar to the original construction. The following actions are required:

Maintain program for exterior restoration

Establish program for interior modifications to provide adaptive use, when applicable

If funding becomes available, develop interpretive programs for the structures

Complete a historic structures report.

Maintenance of Tetrahedrons: There were 72 tetrahedrons installed in 1930 along the Belle Fourche River; the goal is to:

Maintain representative samples in strategic locations that minimize adverse visual impacts.

Maintenance of the Historic Ladder: About 170 feet remain of the 1893 historic ladder on the side of Devils Tower. This ladder is viewed by thousands annually and is a significant item of historic interest. To provide for this use there is a need to:

Develop and implement a cyclic maintenance program to insure perpetuation of the historic ladder.

Museum Collection Management: In the past, collections have not been inventoried, maintained, or stored according to standards prescribed by NPS-28. There is a need to:

Program work for proper storage, collection, and inventories

Use the proposed visitor/administrative facility to house collections with proper humidity and temperature controls.

Archival-Library Management: Archival-library material has been catalogued, but has not been stored according to standards prescribed by NPS-6, there is need to:

Program for a collection management plan, storage improvement, and cataloging in the National Park Service National Catalog and collection

Use the proposed visitor/administrative facility to house historical and archeological collections with proper humidity and temperature controls.

Nominate and/or Evaluate Sites for the National Register of Historic Places: The known archeological and historical sites within the monument have not been evaluated for eligibility or nomination to the National Register of Historic Places. The following actions are necessary:

> By contract or through the Midwest Archeological Center, evaluate archeological sites according to National Register criteria
>
> Program work using Rocky Mountain Region personnel to nominate historic structures to the National Register of Historic Places.

VISITOR USE

Because of the relatively small size of the monument, the entire area is treated as one geographic zone for the purposes of this discussion. The major focus of visitor use will be towards a new visitor/administrative facility located at the tower base. A secondary focus of visitor use is at the Prairie Dog Town, picnic area, and campground. Visitors desiring a challenging experience are accommodated through provisions for climbing activities of the tower itself. Facilities at the tower base, Prairie Dog Town, picnic area, and campground provide recreation opportunities for visitors desiring a more structured and regulated environment. Opportunities for visitors desiring some isolation from the sights and sounds of humans, independence, and a degree of self-reliance are provided along the various trails and dispersed areas of the national monument. Due to restricted size and agricultural activities on surrounding lands, primitive and unconfined recreation experiences cannot be provided at Devils Tower.

A 3-mile paved road continues to serve as the major access and circulatory route within the national monument. This road provides access to the Prairie Dog Town, picnic area, campground, residential and maintenance area, visitor/administrative facility, and other tower-base facilities. A south and west road provides visitor access to various tower-viewing points as well as access to various private lands surrounding the area.

Eight miles of trail will continue to provide pedestrian access within the monument. The major focus is towards the 1.25-mile Tower Trail which provides visitors with an opportunity to "walk around" the tower and view climbing activities. Remaining trails within the monument provide "loops" of travel within the more undeveloped portions of the monument.

An Interpretive Prospectus was approved for Devils Tower in 1979. Interpretive objectives outlined in that plan are:

> To identify, evaluate, protect, and interpret the park's natural and cultural resources on a year-round basis
>
> To foster appreciation and understanding of geologic resources and to provide supplemental interpretation of cultural and other natural resources
>
> To increase visitor awareness of the inherent hazards associated with climbing and other activities within the monument and to provide for the fullest possible visitor safety.

Interpretation and information distribution will continue to be distributed using a variety of sources and mediums. Radio messages are distributed via a TIS radio audio station. The visitor/administrative facility serves as the primary visitor contact medium with geologic, biologic, and cultural theme exhibits. Information counters, climber registration, and cooperating association sales are also provided in this facility. The geologic story of Devils Tower is provided by audiovisual presentations and exhibit interpretations. The following exhibit themes are recommended at the visitor/administrative facility.

> Geology relating to the formation of Devils Tower
>
> Legends of Devils Tower
>
> Climbing History of Devils Tower
>
> Environment of Devils Tower
>
> Devils Tower: The First National Monument
>
> East meets West: Vegetation and wildlife at Devils Tower has a unique mixture of species found in both the western and eastern United States.

The old park headquarters, converted to a seasonal ranger station and seasonal employee residences, also serves as an information distribution facility. Primary emphasis is directed to distribution of visitor/administrative facility hours, interpretive program schedule, hazard warnings, campground information, and pertinent park regulations.

Wayside exhibits are provided at the Prairie Dog Town regarding visitor safety and well being of the animals, the life and dwelling of the town residents, and the former significance of prairie dogs on the western prairie. At the picnic area, a wayside exhibit reinforcing the significance of Devils Tower as the first national monument could be used capitalizing on the excellent views provided. Wayside exhibits along the Tower Trail provide a major source of interpretation. Subject matter includes plants and animals, ecosystems, fire ecology, and climbing.

At each trail, a trailhead marker is provided to identify the trail, give its length, provide warnings of grades, remind visitors of regulations, and provide warnings of potential hazards. Trail interpretation is provided for the Tower and Joyner Ridge Trails. Other trails are not interpreted to maintain their significant value of "discovery experience."

Overnight use is continued at Devils Tower through maintenance of the 51-unit campground. Signs are provided to warn visitors of potential flood hazards at this site. A private campground, located adjacent to the east boundary of the monument, provides overnight facilities for many park visitors. Capacity of the National Park Service campground is approximately 250 people at one time. An amphitheater, north of the campground, and the picnic area provides for scheduled, interpretive programs with seating to accommodate approximately 200 people. Parking to accommodate about 25 vehicles is provided at the Prairie Dog Town for visitors going to or leaving Devils Tower. The new visitor/administrative facility includes parking for about 100 single vehicles and 20 buses/recreation vehicles. This visitor/administrative facility is designed to accommodate the 2,000-plus visitors per day currently trying to use the old visitor center during peak-use seasons. About 8 miles of trails provide hiking opportunities and associated dispersed recreation activities.

Climbing activities continue on Devils Tower. Climber registration programs are continued with management emphasis on climber safety. Current inventories indicate 100-plus climbing routes are available on the tower itself. Historic peak loads of use have been 100 climbers per day. To minimize potential climber conflicts and experience degradation of nonclimbers who view the tower, tower capacity is set at 100 climbers at one time. Regulatory permit systems are established by park personnel to limit use on an as-needed-basis.

Viewing and photographic opportunities are enhanced by providing photo pull-offs along the entrance road. When needed, vegetation is removed to provide vistas or confined views of the tower.

PARK OPERATIONS

The monument's residential and maintenance areas are maintained in their current location south of the entrance road. These facilities are retained in their current location because of excessive costs required for relocation. The relatively small size of the monument allows quick access to all portions of the monument from this location. Potential vandalism to maintenance facilities is minimized through constant National Park Service presence provided by the residential area.

Currently, all National Park Service housing units are used by monument personnel. Under this plan, two additional full-time positions will be established to carry out a variety of management programs. Housing is not available on adjacent private lands. The nearest available housing is in Sundance, Wyoming, (population 1,700) which is 28 miles southeast of Devils Tower. An additional duplex is necessary to house these employees. The duplex is located above identified 100-year flood levels. The existing residential area has sufficient space available to accommodate this multifamily dwelling. The dwelling will use materials and design to capitalize on nonconventional energy sources (such as supplemental solar heat) and optimize energy efficiency.

Employee housing needs are based on staffing levels necessary to implement visitor services, protection, maintenance, and administrative programs inherent to this proposal. In compliance with NPS-36, before structures for use as housing can be constructed, acquired, or converted to government furnished quarters, justification must be submitted to the Director for review and approval. The park's quarters management plan will be an influencing factor in approving such housing requests.

The current headquarters does not provide sufficient room to accommodate permanent staff, office equipment, and file storage. The headquarters will be converted to a seasonal ranger station and seasonal employee residence. New administrative office space will be constructed in conjunction with the visitors/administrative facility thereby opening visitor services year-round. Maintenance facilities will be expanded with two stalls of covered vehicle storage. Increased staffing needs are one full-time resource management specialist, one full-time naturalist, and a part-time (6 months) maintenance worker.

GENERAL DEVELOPMENT/DEVELOPMENT CONCEPT PLAN

Development concepts illustrated below are displayed on Map II.2. They are intended to improve visitor services and resource protection through improvement of visitor and management facilities.

Entrance Station: The historic checking station, built in 1940, is currently used for storage. The station will be retained with adaptive use deemed necessary by park staff to supplement management operations. An entrance station kiosk will be retained for that use.

Roads: The main park road provides access from the entrance station to the visitor center and is 3.0 miles in length. The 1980 Federal Highway Administration (FHWA) Survey identifies a Structural Sufficiency Rating of 56.3 and a Safety Sufficiency Rating of 68.4 for the upper 3.0 miles of this road indicating poor conditions. Reconstruction of the 3.0 miles of road has been previously programmed. Therefore, this proposal does not include costs associated with this improvement. The west and south gravel roads, 1.1 miles in length, will be chip sealed to reduce dust and erosion of road surfaces and reduce current sedimentation levels in the Belle Fourche River and other streams in the monument.

Historically, visitors have pulled off the main park road along strategic points to photograph the tower. This use poses safety hazards for many visitors. Five vehicle pull-outs with a capacity of two to three vehicles each will be constructed for visitors taking tower photographs. Some vegetative manipulation is necessary to provide vistas and confined views of the tower.

Prairie Dog Town: Interpretive signs and about 15 parking spaces are currently provided at the Prairie Dog Town. Many visitors stop at this location to view these animals. During the months of June, July, and August, the parking lot is full and visitors park on the road or do not stop. A full length parking strip will be constructed along each side of the road with a total capacity of 35 vehicles.

Administration Area: Currently, the park headquarters building has 1,256 square feet, public rest rooms, and parking to accommodate about 12 vehicles. The headquarters building will be converted to a seasonal ranger station and seasonal employee residences.

Campground: The existing National Park Service campground and private campground adjacent to the eastern boundary of the monument provide adequate facilities and capacity for visitor use. However, because th National Park Service campground is located entirely within the 100-year floodplain, adequate measures (such as, warning signs and illustrations of flood levels) will be taken to warn visitors of this potential hazard. Also, a flood warning system will be developed in cooperation with the Bureau of Reclamation. The National Park Service will review the bureau's upcoming Emergency Preparedness Plan for Keyhole Dam to help provide adequate warning of imminent flooding.

Picnic Area/Amphitheater: This area presently contains a 20-stall parking lot and seating for about 200 visitors. Seating capacity is more than adequate at the amphitheater; however, vegetation growing in this facility provides habitat for rattlesnakes. Park staff is unable to continually treat vegetation to remove this habitat. To increase operation efficiency and eliminate potential hazards, the amphitheater surface will be paved. Because many visitors drive to the amphitheater from the private campground and the picnic area is used for group functions, the existing parking stalls fill early and visitors park in unauthorized areas which results in vegetative damage and soil compaction. Parking will be expanded by 20 stalls to minimize these adverse environmental effects.

Visitor/Administrative Facility: The current visitor center is generally open during the peak season--May through October. This structure was built in 1935 and has about 1,400 square feet of space of which 904 square feet are available to the public. Peak load at this facility is about 2,000-plus people per day. A 78-vehicle parking lot is currently provided at the visitor center. No accommodations are provided for buses and recreation vehicles. This parking lot is also used by tower climbers. During the peak-use season, the parking lot is full and many visitors simply drive through and, as a result, do not stop. Rest rooms for use by the physically disabled do not currently exist. Because of varying riser/tread ratios on the entrance stairs, safety hazards exist for visitors who do use the existing public rest rooms.

An analysis based on the Visitor Center Design Evaluation, National Park Service, 1976, indicates a need to provide a visitors/administrative facility with about 6,700 square feet. This new facility would accommodate a lobby information area, sales area, museum collection, archival-library, and exhibit space. Because the new visitor facilities also serve as park headquarters, the visitor facility would be open to the public year-round. A 20-stall bus/recreation vehicle parking lot will also be provided to alleviate traffic congestion problems, and the existing parking lot will be reconstructed increasing capacity by 20 vehicles for a total of 100 vehicles. Provision will be made for access and use by the physically disabled. The old visitor center will be converted to space for general storage.

The proposed visitor/administrative facility should be designed to minimize impacts to the resources and visitor experiences. Design should employ techniques to visually blend the structure with surrounding landscapes, thereby not detracting from the park's major resource--the tower itself. To maintain historic integrity of the current historic buildings, design which is sympathetic to the CCC era should be used. Site specific location and layout of the visitor administrative facility should capitalize on tower views from within the building. These views would provide a focal point for interpretive activities.

Trails: Eight miles of trails are within Devils Tower National Monument. A great majority of trail use occurs on the 1.25-mile Tower Trail. Varying widths and excessive grades make this trail unusable by the physically disabled. This trail will be partially reconstructed to provide short segments that are accessible to and usable by the physically handicapped. Remaining trails within the monument will be maintained in their current status.

Utilities: To accommodate increased facilities and visitor use, expansion of water and sewer systems will be required. Estimated waste-water flow is 35,950 gallons per day and expected demand for potable water is 49,900 gallons per day. Sewer system improvement needs include expansion of septic tanks and leach fields at existing comfort stations and enlargement of the treatment system for the visitor/administrative facility. Water-system improvements include upgrading of pumps and lines and additional water storage capacities.

Maintenance/Residential Area: Because of substantial investments, functional relationships to other administrative facilities, and lack of alternative sites, the residential area is maintained in its current location. A duplex to house two additional permanent staff will be constructed in this area. Because this area is subject to flooding in the event of Keyhole Dam failure, the National Park Service will review the Bureau of Reclamation's upcoming Emergency Preparedness Plan. If this plan does not provide adequate provisions for staff safety, the National Park Service will develop and install adequate flood warning systems.

Current locations and facilities associated with the maintenance area are retained including maintenance shop, equipment storage, carpenter shop, fire cache, flammable storage, office, rest rooms, and furnace room. Covered vehicle storage will be expanded by two stalls.

Development Cost Estimates: Following are the gross construction cost estimates for this proposal:

Chip and seal south and west roads	34,000
Expand Prairie Dog Town parking	43,000
Five photo pullouts - 3 stalls each	34,000
Expand picnic area/amphitheater parking	43,000
Pave amphitheater	7,000
New 6,700-square-foot visitor/administrative facility	1,438,000
Visitor/administrative facility parking reconstruction	76,000
Visitor/administrative facility parking - 20-stall bus/recreation vehicle	132,000
Tower Trail partial reconstruction	28,000
National Park Service Duplex	210,000
Sewage treatment expansion	101,000
Water storage and distribution expansion	204,000
Convert Headquarters to Seasonal Ranger Station and Seasonal Residences	30,000
Two-stall, covered vehicle storage	56,000
TOTAL GROSS COST	$2,436,000

PLAN IMPLEMENTATION

Annual operations and maintenance costs required upon full implementation of this proposal is $505,000.

Following is the conceptual phasing program to implement elements of this proposal. Elements of each phase should be substantially completed prior to performing the elements of the next phase.

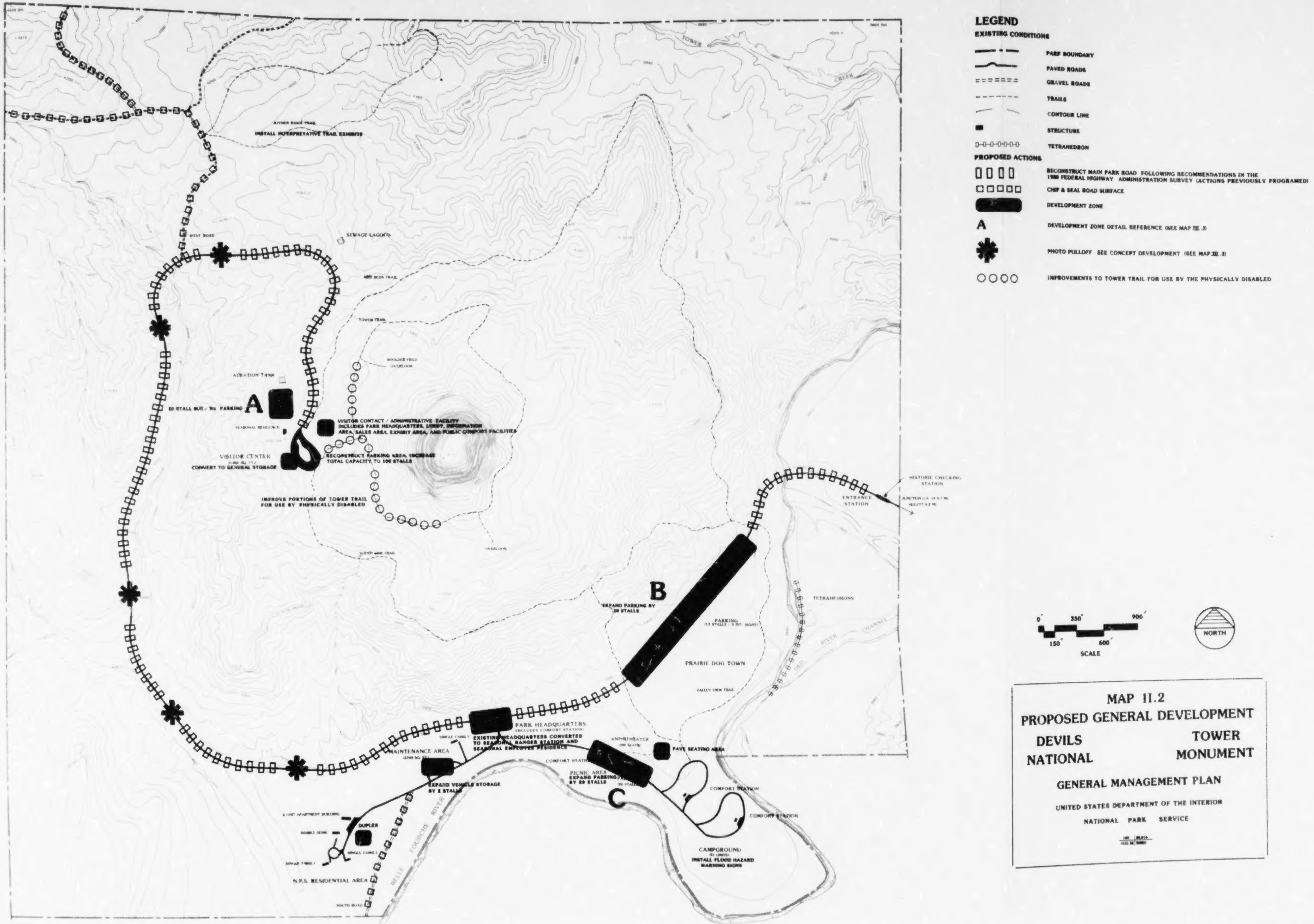
PHASE I

Staffing additions: Resource Management Specialist and a Naturalist

Prairie Dog Town parking	-	43,000
Photo pullouts	-	34,000
Tower Trail reconstruction	-	28,000
National Park Service Duplex	-	210,000
Sewage treatment expansion	-	20,000
Water distribution expansion	-	44,000
		$379,000

PHASE II

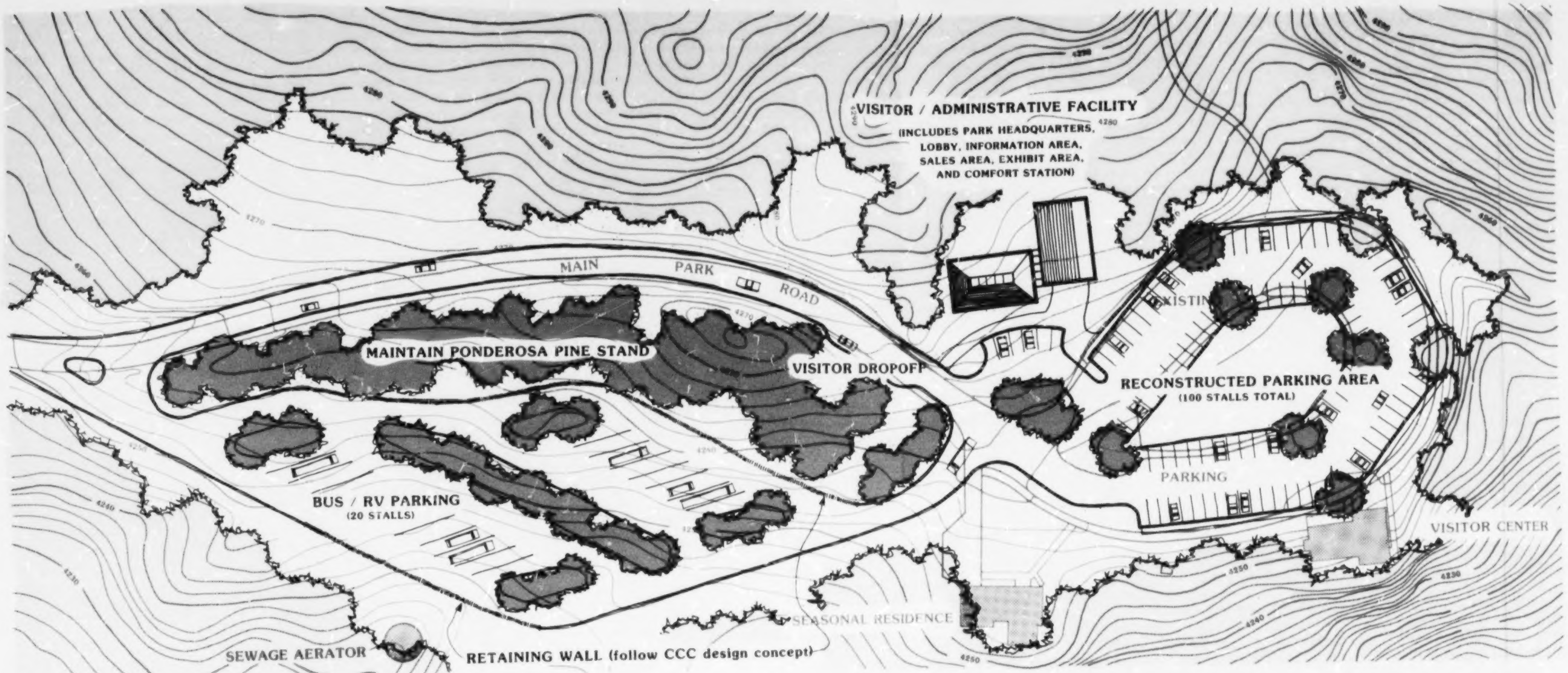
Staffing additions, maintenance worker (part-time)		
Chip and seal periphery roads	-	34,000
Picnic area/amphitheater parking	-	43,000
Visitor/administrative facility	-	1,438,000
Visitor/administrative facility parking	-	208,000
Sewage treatment expansion	-	81,000
Water storage and distribution system	-	160,000
Expand covered vehicle storage by two stalls	-	56,000
Pave amphitheater	-	7,000
Convert headquarters to seasonal ranger station and seasonal residence	-	30,000
		$2,057,000


LEGEND
EXISTING CONDITIONS
PARK BOUNDARY
PAVED ROADS
GRAVEL ROADS
TRAILS
CONTOUR LINE
STRUCTURE
TETRAHEDRON
PROPOSED ACTIONS
RECONSTRUCT MAIN PARK ROAD FOLLOWING RECOMMENDATIONS IN THE 1980 FEDERAL HIGHWAY ADMINISTRATION SURVEY (ACTIONS PREVIOUSLY PROGRAMED)
CHIP & SEAL ROAD SURFACE
DEVELOPMENT ZONE
A
DEVELOPMENT ZONE DETAIL REFERENCE (SEE MAP III .3)
PHOTO PULLOFF SEE CONCEPT DEVELOPMENT (SEE MAP III .3)
IMPROVEMENTS TO TOWER TRAIL FOR USE BY THE PHYSICALLY DISABLED
TOWER CREEK
JOYNER RIDGE TRAIL
INSTALL INTERPRETATIVE TRAIL EXHIBITS
WEST ROAD
SEWAGE LAGOONS
RED BEDS TRAIL
TOWER TRAIL
BOULDER FIELD OVERLOOK
AERATION TANK
20 STALL BUS / RV. PARKING
A
SEASONAL RESIDENCE
VISITOR CONTACT / ADMINISTRATIVE FACILITY INCLUDES PARK HEADQUARTERS, LOBBY, INFORMATION AREA, SALES AREA, EXHIBIT AREA, AND PUBLIC COMFORT FACILITIES
VISITOR CENTER
CONVERT TO GENERAL STORAGE
RECONSTRUCT PARKING AREA, INCREASE TOTAL CAPACITY TO 100 STALLS
IMPROVE PORTIONS OF TOWER TRAIL FOR USE BY PHYSICALLY DISABLED
SOUTH SIDE TRAIL
OVERLOOK
HISTORIC CHECKING STATION
ENTRANCE STATION
B
EXPAND PARKING BY 20 STALLS
PARKING
TETRAHEDRONS
PRAIRIE DOG TOWN
VALLEY VIEW TRAIL
OLD RIVER CHANNEL
PARK HEADQUARTERS
(INCLUDES COMFORT STATION)
EXISTING HEADQUARTERS CONVERTED TO SEASONAL RANGER STATION AND SEASONAL EMPLOYEE RESIDENCE
SINGLE FAMILY
MAINTENANCE AREA
AMPHITHEATER
PAVE SEATING AREA
COMFORT STATION
PICNIC AREA
EXPAND PARKING BY 20 STALLS
C
COMFORT STATION
COMFORT STATION
EXPAND VEHICLE STORAGE BY 2 STALLS
6 UNIT APARTMENT BUILDING
DUPLEX
MOBILE HOME
SINGLE FAMILY
SINGLE FAMILY
N.P.S. RESIDENTIAL AREA
BELLE FOURCHE RIVER
SOUTH ROAD
CAMPGROUND
INSTALL FLOOD HAZARD WARNING SIGNS
0'
350'
900'
150'
600'
SCALE
NORTH

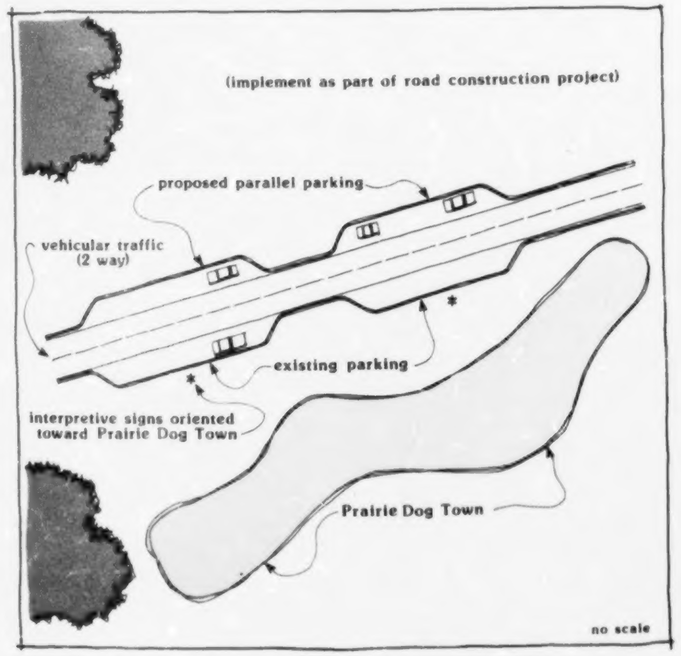
MAP II.2
PROPOSED GENERAL DEVELOPMENT
DEVILS TOWER NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

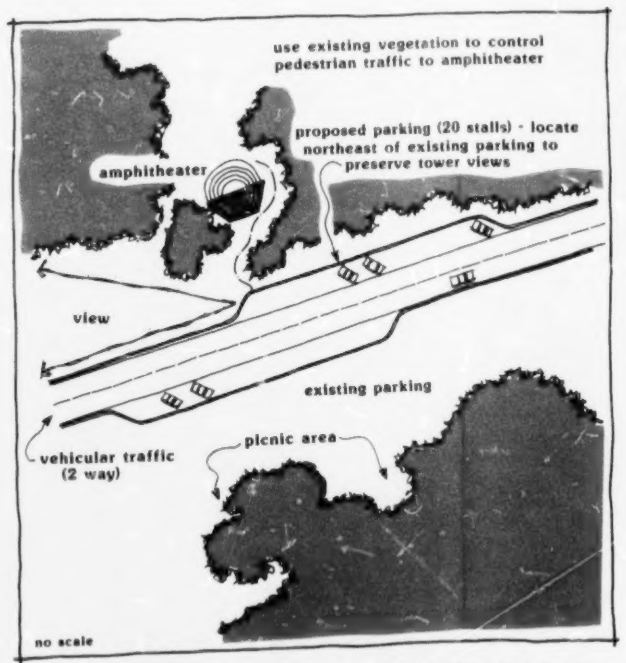
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE


VISITOR / ADMINISTRATIVE FACILITY
(INCLUDES PARK HEADQUARTERS, LOBBY, INFORMATION AREA, SALES AREA, EXHIBIT AREA, AND COMFORT STATION)
MAIN PARK ROAD
MAINTAIN PONDEROSA PINE STAND
VISITOR DROPOFF
XISTIN
RECONSTRUCTED PARKING AREA
(100 STALLS TOTAL)
PARKING
VISITOR CENTER
BUS / RV PARKING
(20 STALLS)
SEASONAL RESIDENCE
SEWAGE AERATOR
RETAINING WALL (follow CCC design concept)
4290
4280
4270
4260
4250
4240
4230
NORTH
0
25
50
100
150
200 feet
SCALE

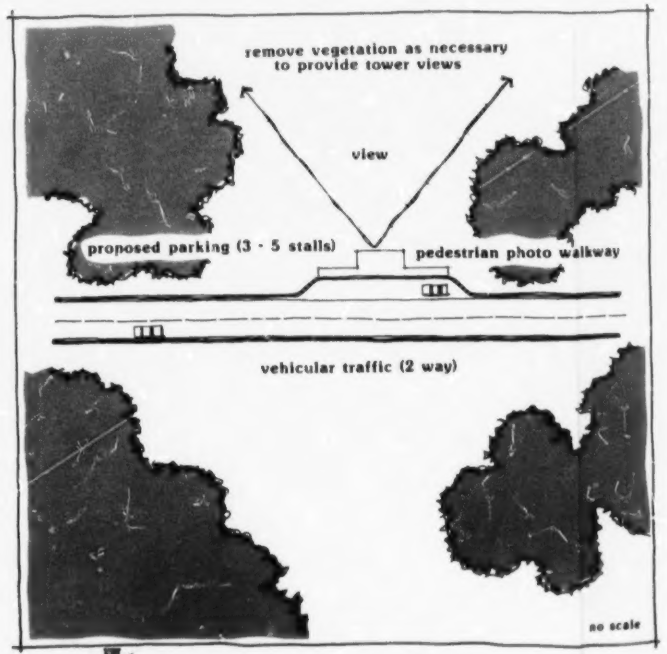
A - TOWER BASE DEVELOPMENT CONCEPT


(implement as part of road construction project)
proposed parallel parking
vehicular traffic
(2 way)
existing parking
interpretive signs oriented toward Prairie Dog Town
Prairie Dog Town
no scale

B - PRAIRIE DOG TOWN PARKING CONCEPT


use existing vegetation to control pedestrian traffic to amphitheater
proposed parking (20 stalls) - locate northeast of existing parking to preserve tower views
amphitheater
view
existing parking
picnic area
vehicular traffic
(2 way)
no scale

C - PICNIC AREA / AMPHITHEATER PARKING CONCEPT


remove vegetation as necessary to provide tower views
view
proposed parking (3 - 5 stalls)
pedestrian photo walkway
vehicular traffic (2 way)
no scale

✱ TYPICAL PHOTO (VIEWING AREA) PULLOFF

MAP II.3

PROPOSED TOWER BASE / AREA SPECIFIC DEVELOPMENT CONCEPTS

DEVILS TOWER NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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C. ALTERNATIVES

Following are descriptions of alternatives considered in this environmental assessment.

Alternative I - No Action

This alternative describes current conditions existing at Devils Tower National Monument. It provides a baseline to compare the relative merits of each alternative. The no-action alternative is required by 40CFR1502.14(d).

Land Use and Management: Management zoning includes a Natural Zone, Development Zone, and Outstanding Natural Feature Subzone; 84 percent is zoned natural, 4 percent is zoned development, and 12 percent is zoned outstanding natural feature.

Natural Resources Management: Current natural resource management programs include the following.

Exotic Plant Management: Leafy spurge and Canada thistle are monitored and individually sprayed to control populations.

Fire Management: As funding permits, plots of ponderosa pine are burned and pre- and post-plot photo points are established.

Animal Pest Management: As needs arise, feral cats and dogs and pack rats are removed through shooting.

Tree Maintenance and Restoration: This includes monitoring and removal of hazardous trees in developed areas.

White-tail Deer Management: This includes maintaining hunting and boundary controls during the hunting season, cooperating with the Wyoming Game and Fish Department, and annually monitoring deer population levels.

Beaver Management: Individual trees are fenced for protection from beaver, this includes semiannually monitoring of beaver damage to trees.

Unique, Rare, and Endangered Species Management: Tower climbing routes in the vicinity of prairie falcons will be closed as needed.

Boundary Control: This includes conducting boundary patrols by park staff, maintaining cooperative National Park Service-adjacent landowner fence maintenance, and a livestock removal program.

Air Quality Management: Air quality monitoring samples are maintained.

Pine Beetle Management: This allows pine beetle infestation to exist unimpeded unless they threaten adjacent lands; if threats occur, individual trees are removed and burned.

Cultural Resource Management: Current cultural resource management programs include:

Maintenance of List of Classified Structures (LCS) Properties: This maintains a program for exterior maintenance.

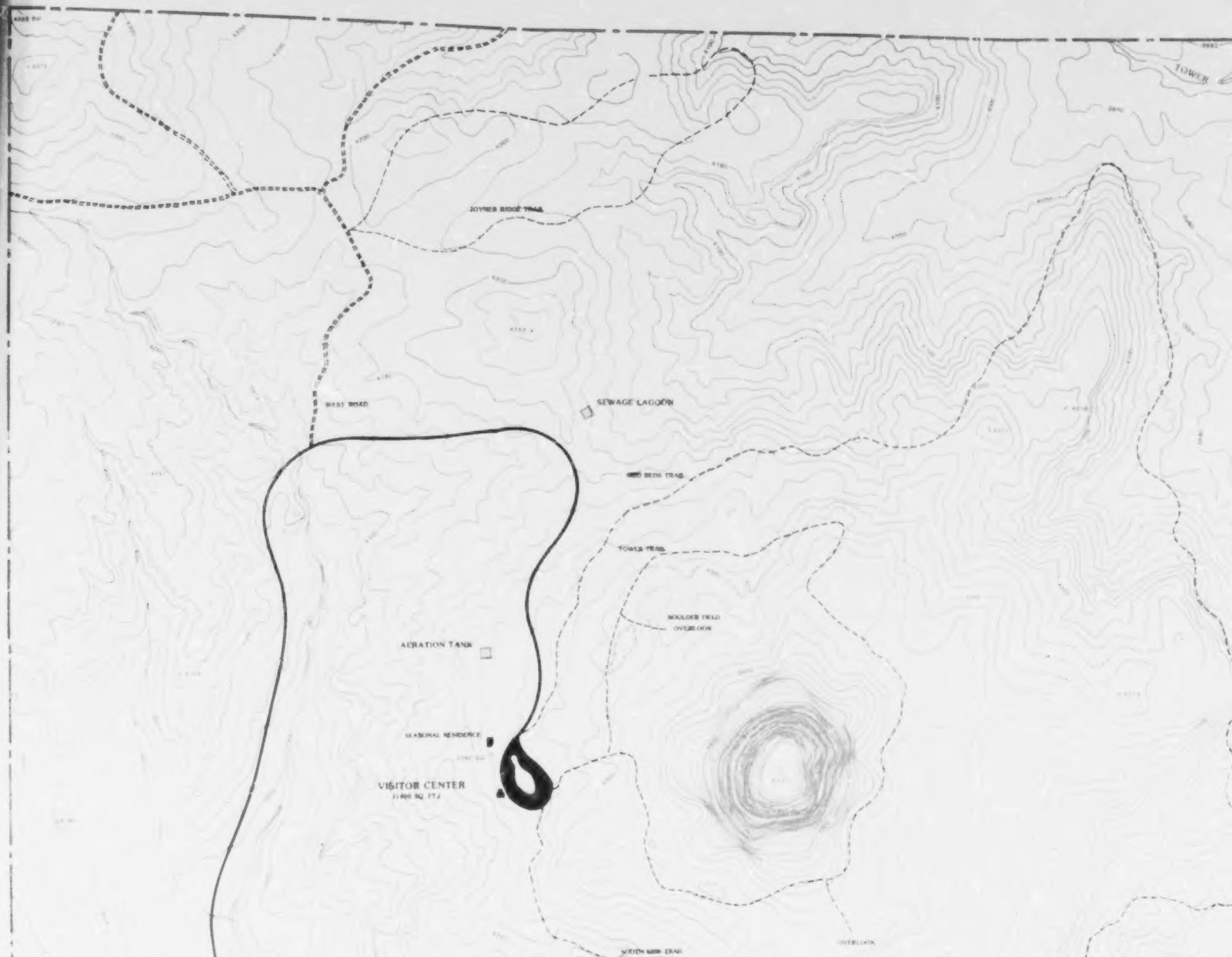
Maintenance of Tetrahedrons: Representative samples will be maintained.

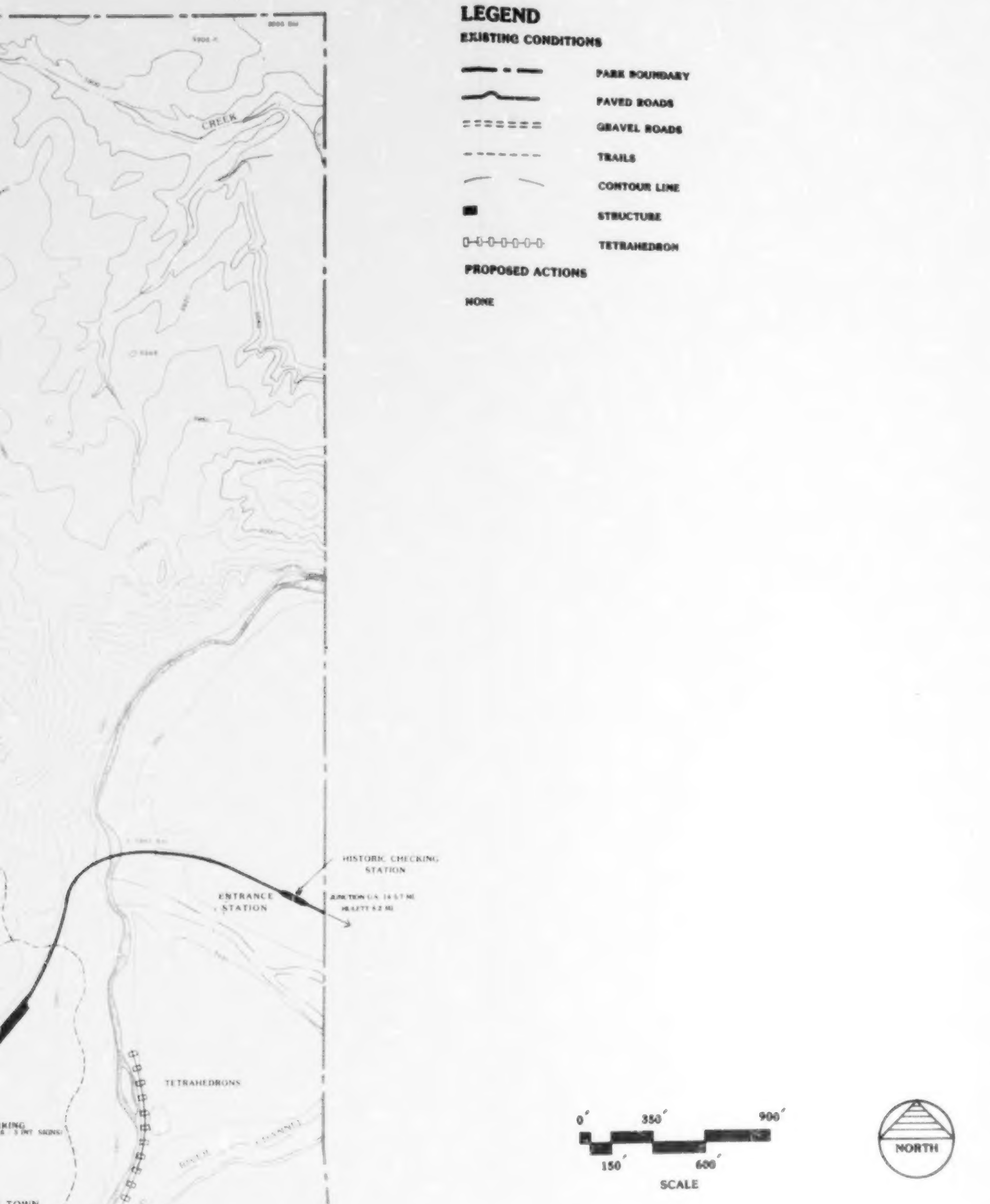
Visitor Use: The major focus of visitor use is oriented to the visitor center and associated tower-base facilities. Secondary focus of visitor use is towards the Prairie Dog Town, picnic area, and campground. Developed areas provide opportunities for visitors desiring a more structured and regulated environment. Trails and dispersed areas of the monument provide opportunities of independence, self discovery, and a degree of self-reliance associated with isolation from the sights and sounds of humans. Challenging opportunities are provided to climbers using the tower.

The 3.0-mile main-park road serves as the major vehicular access and circulatory route. Eight miles of trails provide pedestrian access to dispersed areas of the monument.

Interpretation programs include interpretation of the parks natural and cultural values on a year-round basis, foster appreciation and understanding of geologic resources, and reinforcement of hazards inherent to tower climbing and other activities within the monument. Wayside exhibits are provided along roads and the Tower Trail; all trails are marked with informational signs.

Overnight use is provided by the 51-unit campground, and day use is supplemented by a picnic area and facilities associated with viewing and photographic activities.


TOWER
JOYNER RIDGE TRAIL
WEST ROAD
SEWAGE LAGOON
RED BEDS TRAIL
TOWER TRAIL
BOULDER FIELD OVERLOOK
AERATION TANK
SEASONAL RESIDENCE
VISITOR CENTER
(1400 SQ. FT.)
OVERLOOK
SOUTH SIDE TRAIL
PRAIRIE D
VALLEY V
PARK HEADQUARTERS
(INCLUDES COMFORT STATION)
SINGLE FAMILY
MAINTENANCE AREA
(3769 SQ. FT.)
AMPHITHEATER
(300 SEATS)
COMFORT STATION
PICNIC AREA
PARKING
(30 STALLS)
6 UNIT APARTMENT BUILDING
MOBILE HOME
SINGLE FAMILY
SINGLE FAMILY
N.P.S. RESIDENTIAL AREA
SOUTH ROAD
BELLE FOURCHE RIVER
CAMI



MAP II.4
ALTERNATIVE I
DEVILS TOWER NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

100 | 80,010
AUG 88 | [illegible]

Park Operations: Monument headquarters, maintenance area, and residential area are located in close proximity to each other south of the main-park road.

General Development: Current developments at Devils Tower include:

A historic checking station built in 1940 that is currently used for storage and an entrance station kiosk constructed in 1981

1.1 miles of graded roads, 6.0 miles of paved road

15 parking spaces and 3 interpretive signs at the Prairie Dog Town

1,256-square-foot headquarters building

51-unit campground with 2 comfort stations

Picnic area with parking for 20 vehicles, comfort station, and 200-seat amphitheater

1,400-square-foot visitor center constructed in 1935 with parking for about 78 vehicles; provisions for the physically handicapped are not provided

8 miles of trail

Water, sewer, and electrical utility systems

3,769-square-foot maintenance building

3 single-family homes and a 6-unit apartment

Cost for construction is $14,000 for upgrading and expanding sewage treatment facilities (see Appendix B).

Operational Costs: The budget for Devils Tower in Fiscal Year 1985 is approximately $294,000.

Alternative II - Minimum Requirement

This alternative provides conditions necessary to meet minimum standards required by law, regulation, and policy. Improvements at the monument are limited to those necessary for public health and safety. Analysis of the Minimum Requirement Alternative is required by NPS-2.

Unless otherwise described, this alternative contains similar conditions, management, and programs described for Alternative I. Reference should be made to Alternative I for any elements not described below.

Natural Resource Management: Continue management actions described in Alternative I plus the following:

> Basic Natural Resource Inventories: An updated vegetative and habitat type map will be acquired.

Cultural Resource Management: Continue the management actions described in Alternative I plus the following:

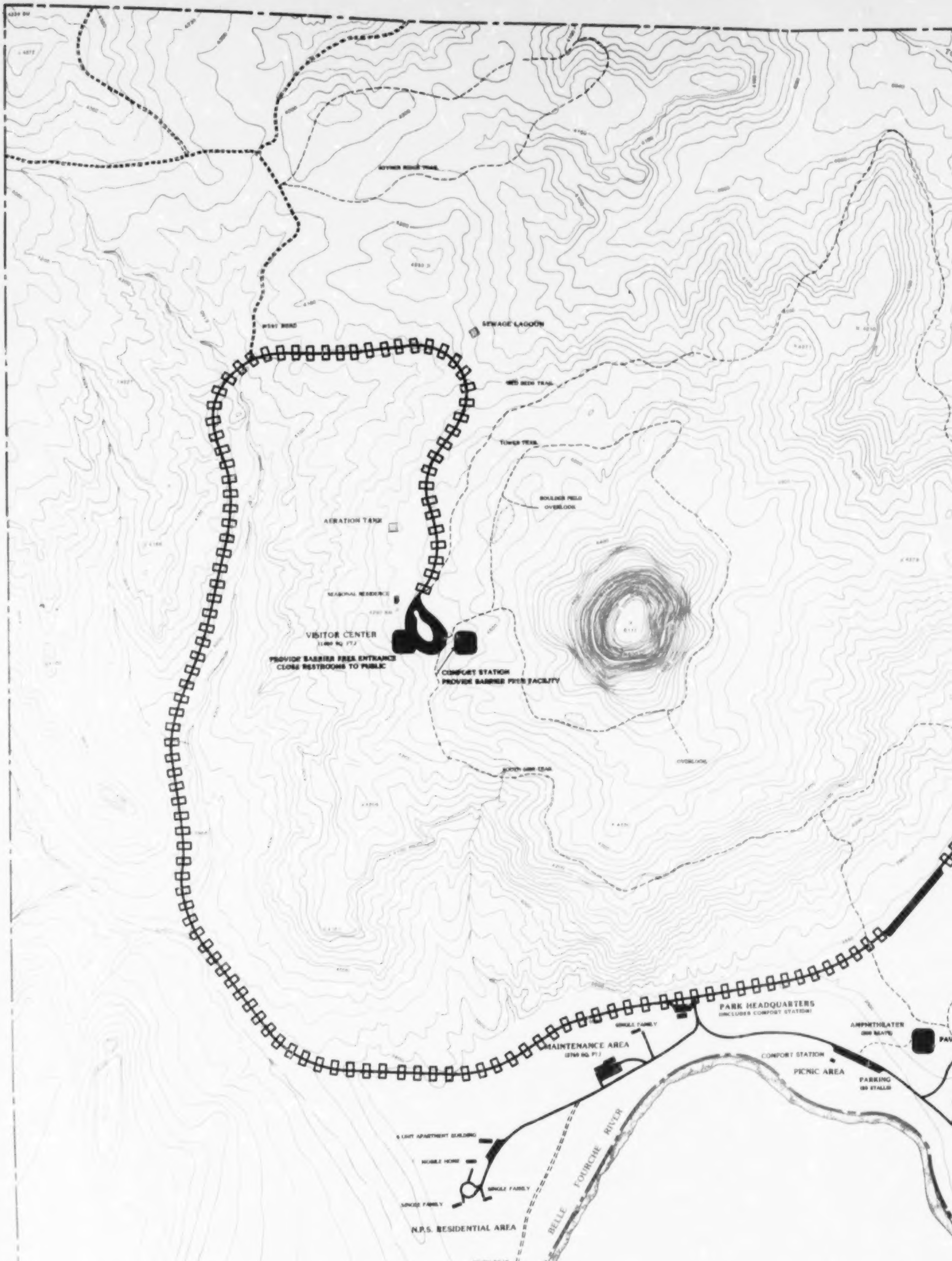
> (1) Nominate and/or evaluate sites for the National Register of Historic Places; (2) through the Midwest Archeological Center, evaluate archeological sites; and (3) through Rocky Mountain Region personnel, nominate historic structures to the National Register of Historic Places.

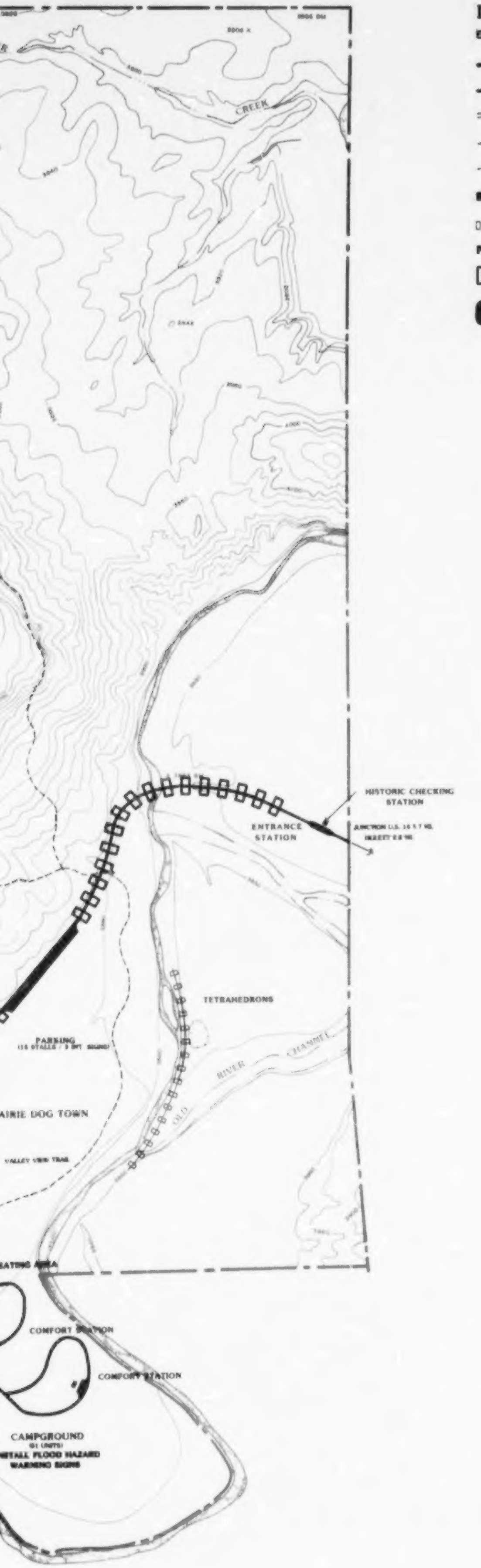
Visitor Use: Use patterns, experience levels, interpretations, and other factors relating to visitor use are the same as those described in Alternative I. Additional visitor-use provisions include reconstruction of the visitor center entrance to eliminate potential hazards and provide accessibility to the physically handicapped. Also included is a comfort station near the visitor center to provide a useable handicap facility, then the visitor center rest rooms would be closed to public use to eliminate hazardous conditions on the access stairs.

Park Operations: In addition to descriptions in Alternative I, the Bureau of Reclamation is encouraged to develop warning systems to notify park employees if Keyhole Dam should fail.

General Development: Improvements necessary include:

> Signs in the campground warning of potential flood hazards and flood levels
>
> Pave the amphitheater to eliminate potential rattlesnake habitat
>
> Construct visitor center access ramp for disabled
>
> Construct a comfort station near visitor center
>
> Expand sewer treatment facilities
>
> Cost for these improvements is $351,000--Appendix B includes detailed cost estimates.


JOYNER RIDGE TRAIL
WEST ROAD
SEWAGE LAGOON
RED BEDS TRAIL
TOWER TRAIL
BOULDER FIELD
OVERLOOK
AERATION TANK
SEASONAL RESIDENCE
VISITOR CENTER
(1,000 SQ. FT.)
PROVIDE BARRIER FREE ENTRANCE
CLOSE RESTROOMS TO PUBLIC
COMFORT STATION
PROVIDE BARRIER FREE FACILITY
OVERLOOK
SOUTH SIDE TRAIL
PARK HEADQUARTERS
(INCLUDES COMFORT STATION)
SINGLE FAMILY
MAINTENANCE AREA
AMPHITHEATER
COMFORT STATION
PICNIC AREA
PARKING
6 UNIT APARTMENT BUILDING
MOBILE HOME
SINGLE FAMILY
SINGLE FAMILY
N.P.S. RESIDENTIAL AREA
SOUTH ROAD
BELLE FOURCHE RIVER
PA



LEGEND

EXISTING CONDITIONS

— - —	PARK BOUNDARY
⁓	PAVED ROADS
=======	GRAVEL ROADS
- - - - - - -	TRAILS
⌒	CONTOUR LINE
■	STRUCTURE
0-0-0-0-0-0-0	TETRAHEDRON

PROPOSED ACTIONS

▯▯▯▯	RECONSTRUCT MAIN PARK ROAD FOLLOWING RECOMMENDATIONS IN THE 1980 FEDERAL HIGHWAY ADMINISTRATION SURVEY (ACTIONS PREVIOUSLY PROGRAMED)
■	DEVELOMENT ZONE

MAP II.5
ALTERNATIVE II

DEVILS TOWER NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

Operational Costs: Although this alternative provides for minimum management of the monument, analysis indicates a need for an annual budget of $350,000.

Alternative III - Emphasize Visitor Services and Management

This alternative emphasizes visitor services, improved management efficiency, and resource protection through improvement and expansion of visitor use and management facilities as well as expanded management programs. This alternative was analyzed in response to public issues regarding expansion of existing facilities.

Unless otherwise described, this alternative contains similar conditions, management, and programs described for Alternative I. Reference should be made to Alternative I for any elements not described below.

Natural Resource Management: Continue management actions described in Alternative I plus the following:

Exotic Plant Management: Cooperation with adjacent landowners, county, and State Agencies involved with noxious weed control will be maintained. A monitoring program for other exotic species in the monument will be developed. There will be cooperation with researchers on the use of biological control agents (such as, hawkmoth) to develop biological control agents for leafy spurge and Canada thistle.

Fire Management: Previous burns will be used as data base to develop burning prescriptions, maintain a master map of the burning program, complete fire history research, and incorporate data into the prescribed burning program.

Prairie Dog Management: Annually monitor populations and signs of town expansion and selectively remove some by shooting. Visitors will continue to be warned against the hazards of feeding animals.

Animal Pest Management: There will be experiments with pigeon population control including contacts with the U.S. Fish and Wildlife Service regarding a joint pigeon management program and research for population control techniques for feral pigeons.

Tree Maintenance and Restoration: A study to determine causes of riparian forest decadence and to develop strategies to correct the situation will be initiated. A native tree planting program to replace losses in visitor-use areas also will be initiated.

White-tail Deer Management: On an regular basis, monitor browse conditions and trends by using photo points of browse plots for comparing browse conditions.

Beaver Management: A study of the beaver-floodplain-forest ecology, to more adequately assess the situation and provide management strategies, will be done.

Unique, Rare, and Endangered Species Management: This will be to study and develop a list of rare and endangered plants within the monument, develop and implement protection and enhancement plans as species are known, monitor for species and continue observation records, and conduct baseline inventories.

Air Quality Management: The region and other interested parties will be informed on air quality trends.

Basic Natural Resource Inventories: These inventories will acquire and update a vegetative and habitat type map; conduct detailed surveys on distribution, composition, and densities by vegetation type; and conduct detailed surveys on composition and density of fish.

Pine Beetle Management: The pine beetle will be monitored within the monument to ascertain the levels of activity.

Water Resource Management: A water resource management plan that addresses water resource problems will be developed.

Cultural Resource Management: Continue the management actions described in Alternative I plus the following:

Maintain a List of Classified Structures' (LCS) Properties: This will establish a program for interior modifications to provide adapted use when necessary, develop interpretive programs for structures, and complete a historic structures report.

Maintenance of Historic Ladder: A cyclic maintenance program will be developed and implemented.

Museum Collection Management: This will program work for storage, collection, and inventories. It will use existing structures to house collections through adapted use.

Archival-Library Management: This will program work for cataloguing/disposing of archival-library materials and will use the existing structure to house collections through adaptive use.

Nominate and/or Evaluate Sites for the National Register of Historic Places: This will evaluate archeological sites through the Midwest Archeological Center and nominate historic structures to the National Register of Historic Places through Rocky Mountain Region personnel.

Visitor Use: The use of patterns, experience levels, and interpretations are similar to those described in Alternative I. Interpretation is expanded with the "east meets west" theme. Under this theme, interpretation is oriented towards plant and wildlife species that occur at the monument and how this area is unique by having species in one location that occur in both the eastern and western regions of the United States.

Capacity at the tower-base facilities are increased with expansion of the existing visitor center and bus/RV parking. Use by the physically handicapped is provided at this facility as well as at the reconstructed Tower Trail. Use capacities are also increased at the Prairie Dog Town and picnic area through parking expansion.

Park Operations: In addition to descriptions in Alternative I, the residental area is expanded with construction of one duplex to house two new positions, a Resource Management Specialist and a Naturalist.

General Development: Improvements provided include:

Chip and seal the south and west roads

Expand Prairie Dog Town parking by 20 vehicles and construction of 3 additional interpretive signs

Expand headquarters by 600 square feet

Signs to warn campground visitors of potential flood hazards and flood levels

Expand picnic area parking by 20 vehicles

Expand existing visitor center by 2,500 square feet and provide a separate comfort station which is accessible to and usable by the physically disabled.

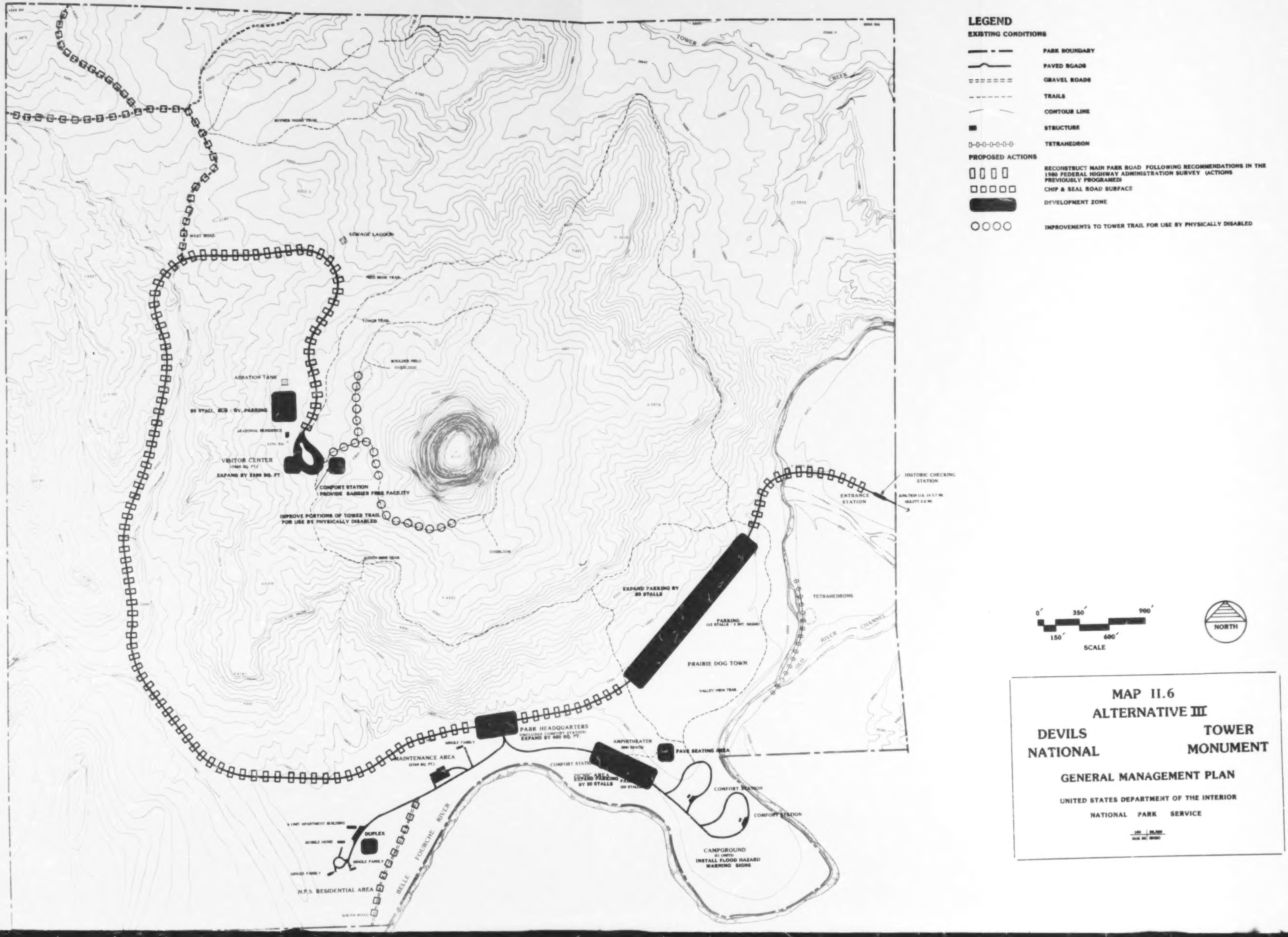
Construct a new 20-vehicle bus/RV parking lot

Partially reconstruct the 1.25-mile Tower Trail for use by the physically handicapped

Expand water storage and distribution and sewer treatment systems

Cost for these improvements is $1,658,000--Appendix B includes detailed cost estimates.

Operational Costs: The annual operations and maintenance costs required upon full implementation of this alternative is $483,000.



MAP II.6
ALTERNATIVE III

DEVILS TOWER
NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Alternative IV - Emphasize Visitor and Management Capacities

This alternative emphasizes visitor services, visitor use, resource protection, and management efficiency through improvement and relocation of visitor and management facilities. The monument's visitor capacity is increased without increases in resource degradation through relocation of major development facilities. This alternative was analyzed in response to public issues regarding location of a visitor facility near the park entrance.

Unless otherwise described, this alternative contains similar conditions, management, and programs described for Alternative III. References should be made to Alternative III for any elements not described below.

Land Use and Management: Management zoning includes a Natural Zone, Development Zone, and Outstanding Natural Feature Subzone--83 percent is zoned natural, 5 percent zoned development, and 12 percent zone outstanding natural feature.

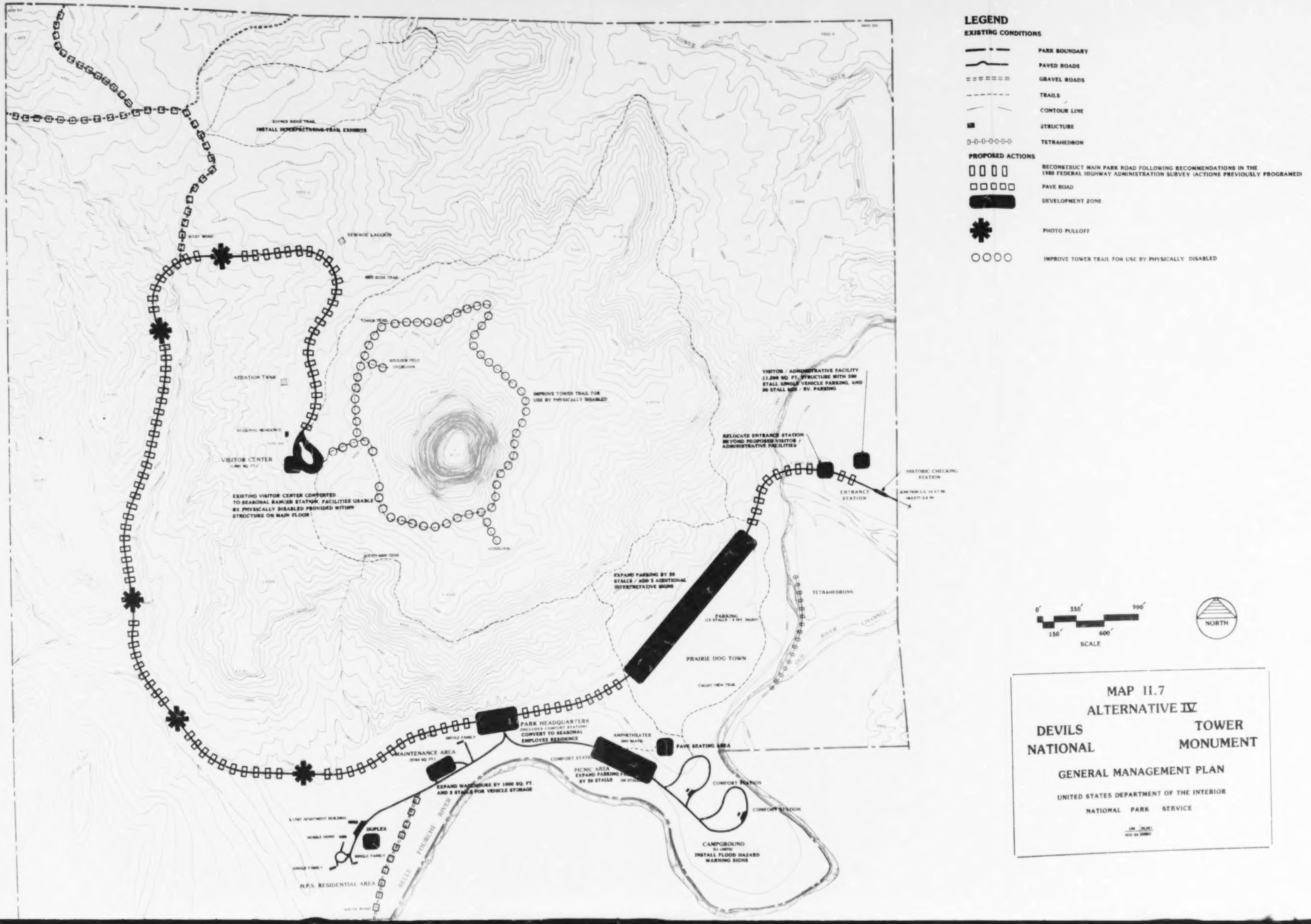
Natural Resource Management: These management strategies are the same as those described for Alternative III.

Cultural Resource Management: These management strategies are the same as those described for Alternative III.

Visitor Use: The major focus of visitor use is oriented towards the new visitors/administrative facility located near the park entrance as well the tower-base facilities. Secondary focus is towards the Prairie Dog Town, picnic area, and campground. Developed areas provide opportunities for visitors desiring a more structured and regulated environment. Experience in dispersed areas are the same as those described in Alternative III.

Interpretation is expanded with the theme "east meets west." Under this theme, interpretation is oriented towards plant and wildlife species that occur at the monument and how this area is unique by having species in one location that occur in both the eastern and western regions of the United States.

The capacities of the visitor-contact facilities and the tower-base facilities are increased. This alternative provides opportunities to employee a shuttle system to transport visitors to and from the entrance to the visitor/ administrative facility and the tower during periods of peak use, thereby reducing the need to expand parking at the


LEGEND
EXISTING CONDITIONS
PARK BOUNDARY
PAVED ROADS
GRAVEL ROADS
TRAILS
CONTOUR LINE
STRUCTURE
TETRAHEDRON
PROPOSED ACTIONS
RECONSTRUCT MAIN PARK ROAD FOLLOWING RECOMMENDATIONS IN THE 1980 FEDERAL HIGHWAY ADMINISTRATION SURVEY (ACTIONS PREVIOUSLY PROGRAMED)
PAVE ROAD
DEVELOPMENT ZONE
PHOTO PULLOFF
IMPROVE TOWER TRAIL FOR USE BY PHYSICALLY DISABLED
JOYNER RIDGE TRAIL
INSTALL INTERPRETATIVE TRAIL EXHIBITS
WEST ROAD
SEWAGE LAGOON
RED BEDS TRAIL
TOWER TRAIL
BOULDER FIELD OVERLOOK
IMPROVE TOWER TRAIL FOR USE BY PHYSICALLY DISABLED
AERATION TANK
SEASONAL RESIDENCE
VISITOR CENTER
EXISTING VISITOR CENTER CONVERTED TO SEASONAL RANGER STATION. FACILITIES USABLE BY PHYSICALLY DISABLED PROVIDED WITHIN STRUCTURE ON MAIN FLOOR
OVERLOOK
VISITOR / ADMINISTRATIVE FACILITY 11,800 SQ. FT. STRUCTURE WITH 200 STALL SINGLE VEHICLE PARKING, AND 30 STALL BUS / RV. PARKING
RELOCATE ENTRANCE STATION BEYOND PROPOSED VISITOR / ADMINISTRATIVE FACILITIES
HISTORIC CHECKING STATION
ENTRANCE STATION
EXPAND PARKING BY 50 STALLS / ADD 3 ADDITIONAL INTERPRETATIVE SIGNS
PARKING
TETRAHEDRONS
PRAIRIE DOG TOWN
VALLEY VIEW TRAIL
OLD RIVER CHANNEL
PARK HEADQUARTERS (INCLUDES COMFORT STATION)
CONVERT TO SEASONAL EMPLOYEE RESIDENCE
SINGLE FAMILY
MAINTENANCE AREA
EXPAND WAREHOUSE BY 1000 SQ. FT. AND 2 STALLS FOR VEHICLE STORAGE
AMPHITHEATER
PAVE SEATING AREA
COMFORT STATION
PICNIC AREA
EXPAND PARKING BY 20 STALLS
COMFORT STATION
COMFORT STATION
CAMPGROUND
INSTALL FLOOD HAZARD WARNING SIGNS
6 UNIT APARTMENT BUILDING
MOBILE HOME
DUPLEX
SINGLE FAMILY
SINGLE FAMILY
N.P.S. RESIDENTIAL AREA
SOUTH ROAD
BELLE FOURCHE RIVER
TOWER CREEK
0′
150′
300′
600′
900′
SCALE
NORTH

MAP II.7
ALTERNATIVE IV

DEVILS TOWER
NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

tower. Use by the physically handicapped is provided at these facilities as well as at Tower Trail. Use capacities are increased at the Prairie Dog Town and picnic area through parking expansion.

Park Operations: These management strategies are the same as those described in Alternative III.

General Development: Reference to Alternative III should be made for elements or improvements not mentioned below. Improvements specific to this alternative include:

Pave the south and west roads

Construct five vehicle pullouts for photography with four to five parking spaces at each

Close the existing visitor center and convert it to a seasonal ranger station and storage area, and include public rest rooms on the main floor with provisions allowing use by the physically disabled. Construct a new 11,500-square-foot visitors/administrative facility near the entrance station and include 200 stalls of single vehicle parking and 30 stalls of bus/RV parking

Convert the current park headquarters to seasonal employee residences

Cost for improvements is $5,281,000--Appendix B includes detailed cost estimates.

Operational Costs: Annual operations and maintenance costs required upon full implementation of this proposal is $600,000.

FIGURE II.1

SUMMARY COMPARISON OF ALTERNATIVES

	ALTERNATIVE I	ALTERNATIVE II MINIMUM REQUIREMENT	ALTERNATIVE III	ALTERNATIVE IV	NPS PROPOSAL
MANAGEMENT ZONING	Natural Zone - 84% Outstanding Natural Feature Subzone - 12% Development Zone - 4%	Natural Zone - 84% Outstanding Natural Feature Subzone - 12% Development Zone - 4%	Natural Zone - 84% Outstanding Natural Feature Subzone - 12% Development Zone - 4%	Natural Zone - 83% Outstanding Natural Feature Subzone - 12% Development Zone - 4%	Natural Zone - 84% Outstanding Natural Feature Subzone 12% Development Zone - 4%
RESOURCES MANAGEMENT					
NATURAL RESOURCES	Current natural resource management programs retained.	Current natural resource management programs retained.	Exotic plant, fire, prairie dog, animal pest, tree, whitetail deer, beaver, endangered species, boundary, air, pine beetle, and water resource programs improved.	Exotic plant, fire, prairie dog, animal pest, tree, whitetail deer, beaver, endangered species, boundary, air, pine beetle, and water resource programs improved.	Exotic plant, fire, prairie dog, animal pest, tree, whitetail deer, beaver, endangered species, boundary, air, pine beetle, and water resource programs improved.
CULTURAL RESOURCES	Current cultural resource sites and programs retained.	Classified structures retained. NRHP nominations completed.	Classified structures retained. Museum collection and archival - library management improved. NRHP nominations completed.	Classified structures retained. Some facilities used for adaptive use. Museum collection and archival - library management improved. NRHP nominations completed.	Classified structures retained. Some facilities used for adaptive use. Museum collection and archival - library management improved. NRHP nominations completed.
VISITOR USE	Current visitor use patterns and capacities retained.	Current visitor use patterns and capacities retained. Some provisions for use by the physically handicapped.	Current visitor use patterns retained. Capacities of visitor center, prairie dog town and picnic area increased. Visitor safety improved and and provisions for the physically handicapped provided.	Visitor use patterns changed and monument capacities increased. Visitor use concentrated to entrance and new visitor/administrative facility with bus service to tower base. Capacities increased by more developed facilities and services oriented towards large groups.	Current visitor use patterns retained. Capacities of tower base facilities increased. Prarie dog town and picnic area capacities also increased. Visitor safety and provisions for the physically handicapped provided.
PARK OPERATIONS	Current locations and capacities of headquarters, residential, and maintenance areas retained. Staffing remains at current levels.	Current locations and capacities of headquarters, residential, and maintenance areas retained. Staffing remains at current levels.	Current locations of headquarters, residential and maintenance areas retained. Staffing remains at current levels.	Current locations of residential and maintenance areas retained. Residential and maintenance areas expanded and staff increased by 3.0 FTE's. Current headquarters converted to seasonal employee residences.	Current locations of residential and maintenance areas retained. Residential area expanded and staff increased by 2.5 FTE's. Current headquarters converted to seasonal ranger station and seasonal employee residence.
GENERAL DEVELOPMENT					
ENTRANCE STATION	Entrance kiosk and historic checking station retained.	Entrance kiosk and historic checking station retained.	Entrance kiosk and historic checking station retained.	Entrance station relocated to west beyond visitor/administrative facility. Historic checking station retained.	Entrance kiosk and historic checking station retained.
ROADS	6 miles of paved road and 4.3 miles of graded roads retained in current condition.	3.0 miles of main park road reconstructed with shoulder widening and straightening of horizontal and vertical profiles to meet minimum safety requirements. Remaining roads retained in current conditions.	3.0 miles of main park road fully reconstructed per FHWA recommendations. West and south roads, 4.3 miles long, chip sealed.	3.0 miles of main park road fully reconstructed per FHWA recommendations. West and south roads, 4.3 miles long, paved. 5 photo pull-offs with parking for 4-5 vehicles each.	3.0 miles of main park road fully reconstructed per FHWA recommendations. West and south roads 4.3 miles long, chip sealed. 5 photo pull-offs with parking for 2-3 vehicles at each.
PRAIRIE DOG TOWN	Parking for 15 vehicles and 3 interpretive signs retained.	Parking for 15 vehicles and 3 interpretive signs retained.	Parking for 35 vehicles and 3 interpretive signs.	Parking for 35 vehicles and 6 interpretive signs.	Parking for 35 vehicles and 3 interpretive signs.
ADMINISTRATION AREA	1,256 sq. ft. headquarters and 12 vehicle parking lot retained.	1,256 sq. ft. headquarters and 12 vehicle parking lot retained.	Headquarters expanded by 600 sq. ft.	Existing headquarters converted to seasonal employee residence. Headquarters relocated near entrance station as part of new visitors/administrative facility.	Existing headquarters converted to seasonal ranger station and seasonal employee residences. Headquarters relocated to Tower Base as part of new visitors/administrative facility.
CAMPGROUND	51 site campground retained.	51 site campground retained and signed to warn of flood hazards.	51 site campground retained and signed to warn of flood hazards.	51 site campground retained and signed to warn of flood hazards.	51 site campground retained and signed to warn of flood hazards.
PICNIC AREA/ AMPHITHEATER	Parking for 20 vehicles and 200 seat amphitheater retained.	Parking for 20 vehicles retained. Amphitheater paved.	Expand parking by 20 stalls. Amphitheater paved.	Expand parking by 20 stalls. Amphitheater paved.	Expand parking by 20 stalls. Ampitheater paved.

SUMMARY COMPARISON OF ALTERNATIVES

	ALTERNATIVE I	ALTERNATIVE II MINIMUM REQUIREMENT	ALTERNATIVE III	ALTERNATIVE IV	NPS PROPOSAL
VISITORS CONTACT	1,434 sq. ft. visitor center and 78 parking stalls retained. 904 sq. ft. available for public use on main floor.	Access to visitors center improved to accommodate physically handicapped. Comfort station provided near tower trail. 78 parking stalls retained.	Visitor center expanded by 2,500 sq. ft. Comfort station provided near Tower Trail. Additional 20 stall bus/RV parking provided.	Existirg visitor's center converted to storage and rangers station. New 11,500 sq. ft. visitors contact/administrative facility located at park entrance with 200 stalls of single vehicle parking and 30 stalls of bus and RV parking.	Existing visitors center converted to storage. New 6,700 sq. ft. visitors /administrative facility located at tower base. Additional 20 stall bus/RV parking provided.
TRAILS	8 miles of trail retained.	8 miles of trail retained.	Portions of the 1.25 mile Tower Trail improved for by physically handicapped.	Entire 1.25 mile Tower Trail improved for use by physically handicapped.	Portions of the 1.25 mile Tower Trail improved for use by physically handicapped.
UTILITIES	Expand septic tanks and leach fields at existing comfort stations.	Expand septic tanks and leach fields at existing comfort stations.	Expand septic tanks and leach fields at existing comfort stations, new septic tank and leach at new comfort station. Upgrade water pumps and lines, additional water storage.	Expand septic tanks and leach fields at existing comfort stations, new septic tank and leach field at new comfort station, install new sewage system at entrance visitors center. Upgrade power to 3 phase at water pumps, upgrade water pumps and lines, additional water storage.	Expand septic tanks and leach fields at existing comfort stations, enlarge treatment system at visitors center. Upgrade power to 3 phase at water pumps, upgrade pumps, lines, additional water storage.
MAINTENANCE/ RESIDENTIAL AREA	3,800 sq. ft. maintenance building, 3 residences and 6 unit apartment retained.	3,800 sq. ft. maintenance building, 3 residences and 6 unit apartment retained.	Additional duplex constructed in residential area.	Additional duplex constructed in residential area. Expand maintenance area with 2 stall covered vehicle storage and 1,000 sq. ft. of warehousing.	Additional duplex constructed in residential area. Expand maintenance area with 2 stall covered vehicle storage.
DEVELOPMENT COST ESTIMATE	$14,000	$351,000	$1,658,000	$5,281,000	$2,436,000
ANNUAL OPERATIONS COST ESTIMATE	Current - $294,000	$350,000	$483,000	$600,000	$505,000

CHAPTER III

THE AFFECTED ENVIRONMENT

INTRODUCTION

This chapter summarizes the significant physical and biological characteristics of Devils Tower National Monument. Also, it summarizes visitor-use data as well as local and regional land use and facilities. This chapter describes those aspects of the environment likely to be affected by either the proposed plan or the alternatives to the proposed plan including major areas of concern identified by the public.

NATURAL RESOURCES

Hydrology

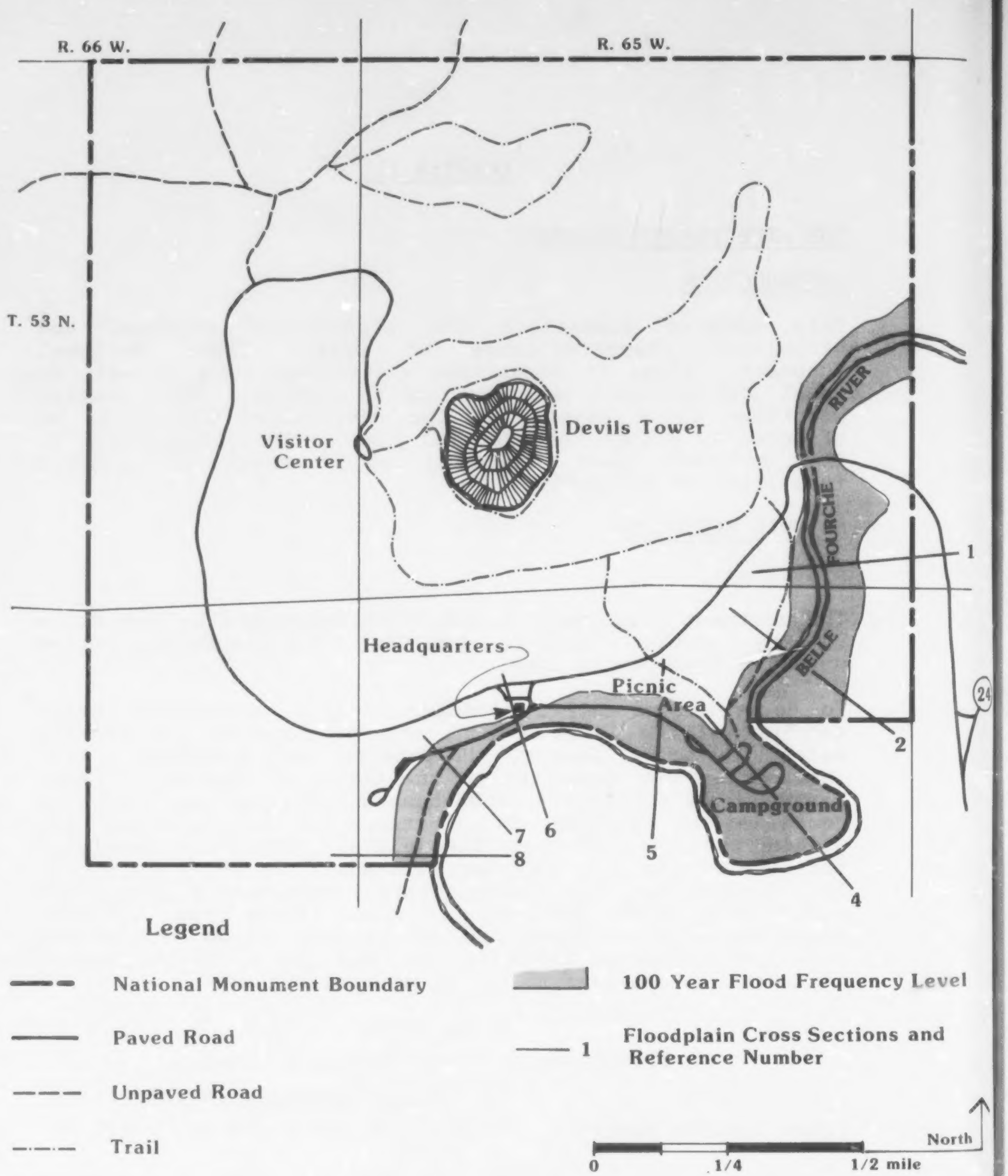
The monument's southern boundary is traversed by the Belle Fourche River. Keyhole Dam is 17.8-floodplain miles upstream from Devils Tower.

To determine potential flooding hazards, floodplain cross sections of the Belle Fourche were prepared by the Wyoming Water Research Center, University of Wyoming. This information was submitted to the Corps of Engineers, Omaha District, to complete a flood-hazard analysis--the report is contained in Appendix C. Portions of the monument are within the the 100-year floodplain. The only developed facility within the 100-year floodplain is the campground. It appears that the headquarters, maintenance area, and residential area are located just above the 100-year frequency level. Elevations of various flood frequencies are illustrated on Table III.1. Map III.1, Flood Hazard, illustrates locations of the cross sections used.

Table III.1

Elevations by Flood Frequency Level

Floodplain	Flood Frequency (yr/elevation)			
Cross Section Number	10 yr.	50 yr.	100 yr.	500 yr.
1	3847.55	3851.55	3853.57	3858.08
2	3849.66	3853.68	3855.84	3860.35
4	3853.30	3857.54	3859.02	3862.57
5	*3855.21*	*3860.13*	*3861.46*	*3863.98*
6	3856.79	3861.21	3862.57	3865.68
7	3857.75	3861.88	3863.25	3866.53
8	3858.39	3862.39	3863.82	3867.17



Map III.1

Flood Hazard Map

Devils Tower National Monument

U.S. Department of the Interior - National Park Service

109	80015
July 85	RMRO

The Bureau of Reclamation is currently preparing an Emergency Preparedness Plan which outlines actions that will be taken in the event of failure of Keyhole Dam. If the dam would fail, their preliminary data indicates a flood arrival time of 3 hours with a 55-foot water depth at the entrance bridge.

For water quality purposes, the Wyoming Department of Environmental Quality has classified the Belle Fourche River as Class II. This designation indicates the river contains, or has the potential to provide, habitat for game fish species. Water quality of the Belle Fourche should be maintained within parameters that will support game fish.

Water rights at the monument (Table III.2) have been certified by the Wyoming State Engineers Office.

Table III.2

Devils Tower Water Rights

Source	Quantity of Water
Well Number 53-65-18bbd2	200 gpm
Spring Number 1	22.8 gpm
Spring Number 2	61.4 gpm
Spring Number 3	1.1 gpm
Spring Number 4	water right purchased with a land purchase, quantity of water unknown

Vegetation

Since the monument is situated on the northwest flank of the Black Hills region, it contains vegetation commonly found on the western side of the Black Hills at mid-elevation ranges from 3,500 to 4,500 feet. A ponderosa pine forest covers approximately 60 percent of the monument, with canopy closures ranging from 10 to 80 percent. The forest completely surrounds the tower, but is densest and most extensive on the north and west sides. Also found in association with the ponderosa pine are Rocky Mountain Juniper and bur oak; these are usually at lower elevations within the forest. Cottonwood and two species of willow are common on the Belle Fourche River floodplain in the southernmost and lowest part of the monument. Other broad-leaved trees found at lower elevations in the monument include green ash, dogwood, hawthorne, wild plum, and chokecherry. Additional understory plants include serviceberry, common juniper, sagebrush, poison ivy, skunkbush, buffalo berry, snowberry, and kinnikinnik. Shrubs found in open or less-forested areas include rabbitbrush, snakeweed (matchbrush), yucca, and pricky pear cactus. The top of Devils Tower supports a dry big sagebrush community, but big sagebrush is uncommon at lower elevations in the monument where several other species of sagebrush are much more common.

Where forest canopy cover is less than 50 percent and in open areas, a great variety of herbaceous plants and grasses are found, which reflect composition of plant communities found considerably further east and west of the Black Hills. Of some 61 grass species found in the monument, approximately two-thirds are representative of midgrass prairie with the remaining one-third having species transitional to or representative of short-grass prairie environments. In moist, shaded drainages a variety of sedges, rushes, ferns, and moss exist which also are found in environments much further east and west than the Black Hills.

No rare or endangered plants are known to exist in the monument, although one herbaceous plant, the coneflower (*Echinacea pallida*, va. *angustifolia*), which is found in the vicinity of the bridge near the monument entrance, is a plant out of its normal range. More abundant in eastern Colorado, this plant is suspected to have been artificially transported to the Devils Tower area because of its proximity to the entrance road (Marriott, 1984).

Wildlife

A great variety of wildlife is present at Devils Tower largely because of the transitional nature of the monument's environment. Situated strategically between mountain and plain physiographic regions, the Devils Tower area is highly diverse offering many varieties of habitat. Like the vegetation, this diversity is reflected in the overlapping of species found in both eastern and western parts of the nation.

White-tailed deer and mule deer are the only large mammals found at Devils Tower. White-tailed deer are present year-round; their population is enhanced by the mix of woodland and meadow habitat and by the sanctuary the monument affords from hunting pressure. Most of the deer population is not resident to the monument, but they use adjacent lands heavily. Most white-tailed deer populations are artificially maintained by farming practices on adjacent lands. Mule deer use the monument during the winter months, but move to the surrounding areas during the milder seasons.

Smaller mammals are numerous including cottontail rabbits, porcupine, raccoon, several species of tree and ground squirrel, pocket gophers, woodrats, kangaroo rats, mice, and shrew. Small predators include coyote, red fox, swift fox (rarely seen), badger, and longtail weasel. A large colony of blacktail prairie dogs is located along the entrance road in the Belle Fourche Valley. This animal is commonly seen by visitors as they enter and leave the monument. Prairie dogs reproduce very rapidly, and the monument has had to periodically take control measure to prevent the town from spreading to other parts of the monument.

Birds are among the most diverse of all types of wildlife in the monument. Over 90 different species have been identified. Over 50 species of songbirds have been identified at Devils Tower including robin, brown thrasher, veery, red-eyed vireo, western tanager, black-capped chickadee, several types of sparrows, warblers, juncos, grosbeaks, buntings, and nuthatches. Birds commonly seen flying around the tower are Coopers and red-tailed hawks, prairie falcons, American kestrel, golden and bald eagles, turkey vultures, swallows, pigeons, and rock wrens. Also present in the monument are several species of owl, mallard, canvas-back, wild turkey, and Chinese pheasant.

Rattlesnakes are found in the monument--most commonly associated with the tower. They have been observed on the top the tower, as well as climbing up and down, and inside fractures in the rock. Bullsnakes are present in and around the Prairie Dog Town, where they prey on prairie dog pups and other small rodents.

The monument is within the range of black-footed ferrets. These species are not known to exist here. There was a survey for the black-footed ferret in the 1960's and 1970's; these efforts were unsuccessful. Bald eagles are observed frequently in the winter although they are not known to nest here. Prairie falcons have been known to nest on the tower and prey on pigeons who frequent the area. The Wyoming Game and Fish Department determined the tower to be a potential peregrine falcon hacking site; however, due to high use it was determined that a viable program would not work.

Geology

Devils Tower, one of the most conspicuous geologic landforms of the Black Hills region, is a 600-foot high steep-sided mass of igneous rock surrounded by rough, horizontal layers of sedimentary rock about 400-feet thick which have been structurally deformed into a circular dome surrounding the tower. The igneous rock of the tower is classified as phonolite porphry of Tertiary age. Fresh specimens have a light- to dark-greenish gray, very fine-grained groundmass with conspicuous crystals of white feldspar 1/4 inch to 1/2 inch in diameter and smaller dark green crystals of pyroxene. The phonolite weathers to a light gray or brownish gray, and is frequently covered with green, yellowish green, or brown colored lichens (Robinson 1955).

Rocks of the tower are strikingly shaped into vertical polygonal columns, most commonly having five sides--with some having four or six sides--and diameters of up to 6 to 8 feet. The columns tend to flare out at the base, some become almost horizontal on the southwest side of the tower. At the base of the tower, jointing is poorly developed forming irregular blocks rather than columns. The highly developed columnar jointing, which contributes to the uniqueness of the tower, is caused by contraction of the once molten-igneous rock as a result of its cooling (Robinson 1955).

Although many theories on the origin of Devils Tower have been put forth, two in particular have been popular throughout the approximately 100 years of geologic study that has been done in this area. One of the earliest theories is that the tower is the eroded and exposed neck of an extinct volcano (Carpenter 1888) an idea that was echoed years later by Schwantz (1936). Another theory, which gained popularity in the early to mid-1900's was that Devils Tower and Missouri Buttes--4 miles northwest of the tower--are the remnants of laccolithic structures, such as intrusive bodies which cooled and solidified beneath the earths surface (Jaggar 1901, Danton 1907, and Robinson 1955). More recently, a geologic and petrologic study of the tower, more thorough than past investigations (Halvorson 1980), concludes that the tower is volcanic in origin. Although geologists may continue to debate the mode of origin of the tower for many years to come, the evidence presented in this latest and most detailed study has provided additional evidence supporting the earlier theory that the tower was indeed once the neck of a long extinct volcano.

The 400-foot thick layer of sedimentary rocks surrounding the tower consist of three formations--the spearfish formation of Triassic age, the Gypsum Spring formation of Middle Jurassic age, and the Sundance formation of Late Jurassic age. Except for the tower and the talus slopes at its base, exposures of these sedimentary formations cover the remainer of the monument.

The sedimentary rocks around the tower form a concave dome with a radius of 3,500 to 5,000 feet; but, from 2,000 to 3,000 feet from the tower, the beds reverse their dip to form a small structural basin around the tower. Superimposed on this larger "collapsed dome" structure are numerous smaller folds, basins, and domes cut by many faults with small displacements.

The Spearfish formation is found in the southern and northeastern parts of the monument along the Belle Fourche River Valley and its tributaries. It forms prominent brownish-red to maroon colored cliffs along the north side of the Belle Fourche Valley within the monument. It consists of red to maroon siltstone and sandstone with interbedded mudstone and shale.

The Gypsum Spring formation forms a 15- to 35-foot thick, nearly continuous band around the tower from the northeast to the southwest. It also crops out on a small hill just north of the monument entrance. This formation is a conspicuous white-colored layer of gypsum contrasting with the deep red of the underlying Spearfish formation, and the gray-green shale marking the base of the overlying Sundance formation.

The Sundance formation consists of alternating layers of greenish-gray shale, light-gray to yellowish-brown sandstone and siltstone, and gray limestone. It forms bluffs and low rolling hills that immediately surround the tower out to a distance of 1,000 to 1,500 feet on all sides. The formation has been divided into four members, which are described in more detail by Robinson (1955). The Sundance formation contains numerous fossils including clams, oysters, belemnites, and other types of marine fauna.

In the valleys of the small streams radiating from the tower and all along the valley of the Belle Fourche River, unconsolidated alluvium is found. Also, sand and gravel terraces have been cut into the Spearfish formation along the Belle Fourche River in the vicinity of the administration building and the employee housing area.

Overlying the upper portion of the Sundance formation, large blocks of phonolyte form a talus slope completely surrounding the tower at its base. Large rocks have also rolled off of the talus forming boulder fields 1,000 to 1,500 feet from the tower. Individual boulders are commonly found 1/4-mile from the tower. The current visitor center area and associated parking are located in an area where tower debris is abundant, both at the surface and within the soils. About 1,400 feet northwest of the tower, two small talus deposits consisting of sandstone and quartzite are believed to be remnants of rocks belonging to the Lakota formation, which once overlayed the Sundance formation in the area around the tower.

CULTURAL RESOURCES

Historical

Six historic structures are at Devils Tower National Monument--a residence, visitor center, checking station, fire-hose shed, tetrahedrons, and a historic ladder. Management of these structures is outlined in the Cultural Resource Management Plan for Devils Tower National Monument, and they are summarized in Figure III.1.

FIGURE III.1

Current Management of Historic Structures

Structure	Management Policy
Residence	Preserve exterior, upgrade interior
Visitor Center	Preserve exterior, upgrade interior
Entrance Station	Preservation
Fire-Hose House	Preservation
Tetrahedrons	Partial removal
Historic Ladder	Preservation

The significance of all of the historic structures is local; they have not been nominated for the National Register of Historic Places.

The residence is used for seasonal housing today and contains a living room, kitchen, bathroom, two bedrooms, a garage, and a half basement. Originally constructed in 1931, this residence was renovated to include additions in 1937.

In 1935, the Civilian Conservation Corps constructed the present visitor center. The building is a log and stone structure set on a steep incline in the old headquarters area at the base of Devils Tower. The interior was remodeled in 1961.

The entrance station was built in 1940 and is used for storage today. The entrance station is a small rectangular-shaped, one-story log structure set on a sandstone foundation.

The fire-hose house is between the visitor center and the residence at the base of Devils Tower. The estimated date of construction is 1937. It is a small log structure with a stone footing and floor.

There are 72 tetrahedrons on the banks of the Belle Fourche River. They were installed in 1930 and are constructed of reinforced concrete. Their purpose was to divert the river into a new channel to protect a bridge.

Approximately 170 feet of the 1893 ladder remains on the side of Devils Tower. In the early 1930's, the lower 100 feet were removed for safety reasons. This ladder was constructed by two local ranchers by cutting pegs from oak, ash, and willow and driving them into a crevice to fashion a 350-foot ladder to the top of the tower.

Archeological

Approximately 80 percent of the monument has completed archeological surveys. These investigations resulted in the formal identification and description of 16 sites--1 is historic, and the remaining are prehistoric. All of the known archeological sites are lithic scatters; they are described as follows:

Site Number	Description
48CK83	Lithic scatter along the top and south slope of a prominent ridge extending northeast from Devils Tower
48CK85	Composed of very restrictive lithic scatter covering about 500 feet at the tip and along the sides of a short ridge
48CK86	Light scatter of lithic debris atop a short ridge covering 100 to 150 feet
48CK87	Site is represented by a light scatter of irregularly shaped angular grey chert-flaking debris across 125 feet at edge of steep slope
48CK88	Represented by a moderately heavy scatter of chert-flaking debris lying across 800 feet atop a low ridge
48CK89	Material observed limited to one large red quartzite biface on a 2- to 3-acre bench

48CK90	Consists of heavy concentrations of chert flakes, cores, and debitage which either lies atop or has formed a low mound about 45 feet in diameter
48CK91	Represented by a light scatter of quartzite and chert-flaking debris across 200 feet of a long ridge
48CK92	Identified in an area of rolling terrace and meadow represented by a light scattering of quartzite and chert-flaking debris lying across 2 to 3 acres
48CK93	Consists of a very light scatter of chert and quartzite atop 2,000 feet of a northeast ridge
48CK94	Light scatter of lithic debris over 2,100 feet along the edge of a series of three prominent north-facing scarps
48CK95	Represented by a very small number of chert flakes and a small irregular core identified on the slope of a prominent steep-sided erosional remnant
48CK96	Consists of a linear exposure of lithic material lying along 4,000 feet of the edge of a prominent scarp
48CK97	Light scatter of lithic debris atop two low erosional remnants in rolling grassland
48CK98	Light scatter of lithic material lying across approximately 2,000 feet of a tank terrace.

VISITOR USE DATA

The log visitor center built in 1935 has peak loads of 2,000-plus people per day. This results in severe crowding and many people are unable to obtain information.

The monument is primarily a day-use area. However, the area is open 24 hours a day all year-round. The visitor center is usually open from 8 a.m. to 7:45 p.m. during the peak season--June through Labor Day. The visitor center closes from November 1 through April 30. Visitor services are handled at the administration building during this period.

Total visitation, since record keeping began in 1921 through December 31, 1984, is 5,809,948. Annual visitation for the past 10 years is illustrated on Figure III.2.

The greatest visitation in a single month was July 1981. It was 90,996. This was a daily average of 2,935. About 70 percent of all annual visitation occurs during June, July, and August. Monthly visitation for 1984 is illustrated on Figure III.3. Wednesday is usually the busiest day during the summer; weekends are the busiest in the off season.

Each year visitors arrive representing each of the 50 States and several foreign countries, especially Germany. The average length of stay is about 1 hour. Overnight stays in the campground during 1984 were 13,848.

The principal activities that visitors participate in are viewing exhibits, photography, walking a portion of the Tower Trail, technical mountain climbing, picnicking, and camping.

Climbing continues to be a traditional use of the tower. By December 31, 1984, 17,088 people had climbed to the top. All climbers must comply with regulations and a mandatory check-in and check-out system.

A traditional Old Settlers Picnic Day is held annually on the third Sunday of June.

There are frequent family reunions--usually of a picnic variety--and an occasional wedding.

The movie, "Close Encounters of the Third Kind," has had a dramatic impact on visitation. The monument staff continues to get questions about it even though it has been 7 years since the movie was first released.

Figure III.4 illustrates projected visitation at the monument. This indicates visitation ranging from 241,000 to 433,000 annually with an average increase of 5 to 6 percent annually.

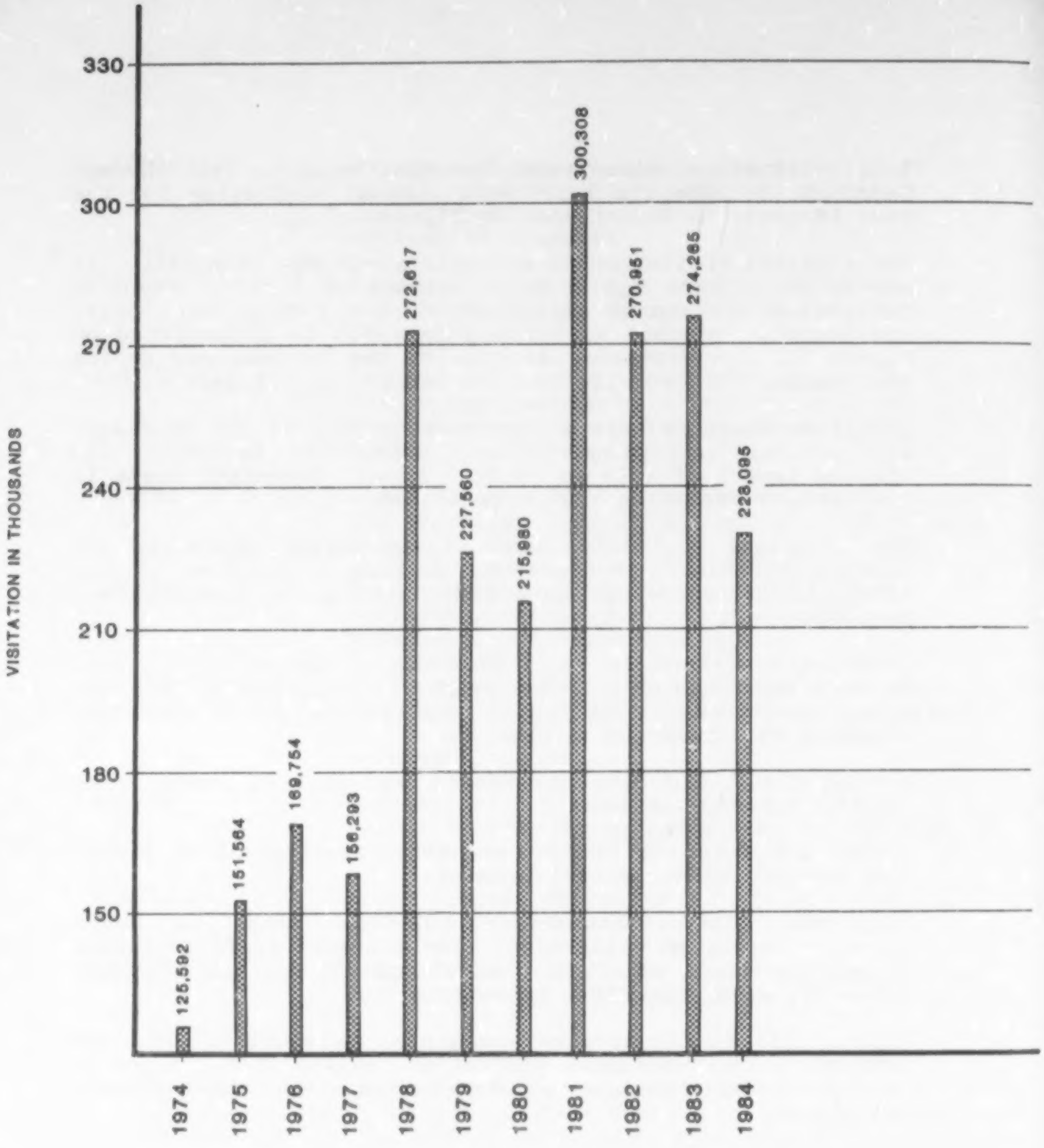


FIGURE III.2
ANNUAL VISITATION
DEVILS TOWER NATIONAL MONUMENT
UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

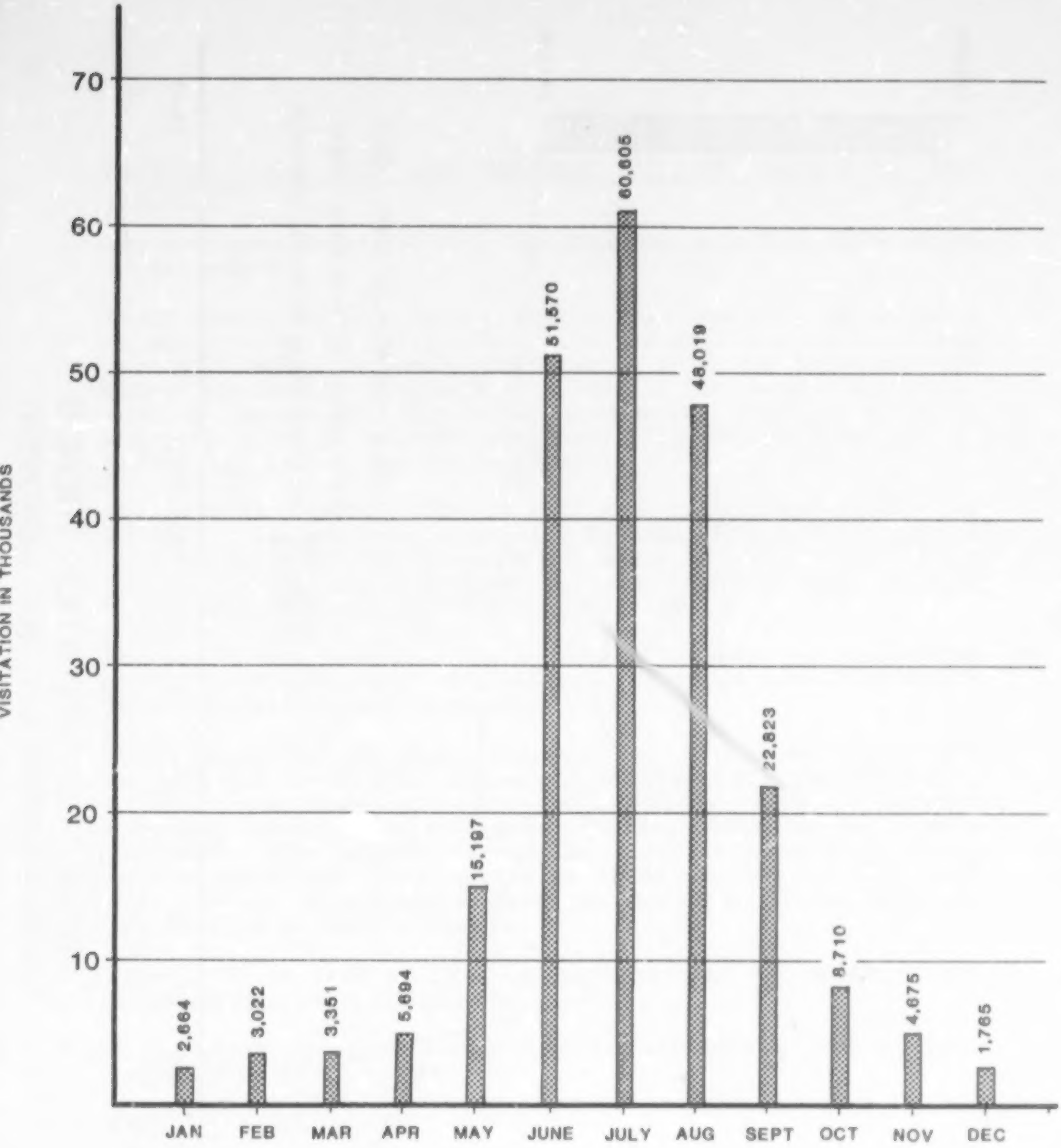


FIGURE III.3

MONTHLY VISITATION - 1984

DEVILS TOWER NATIONAL MONUMENT

UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

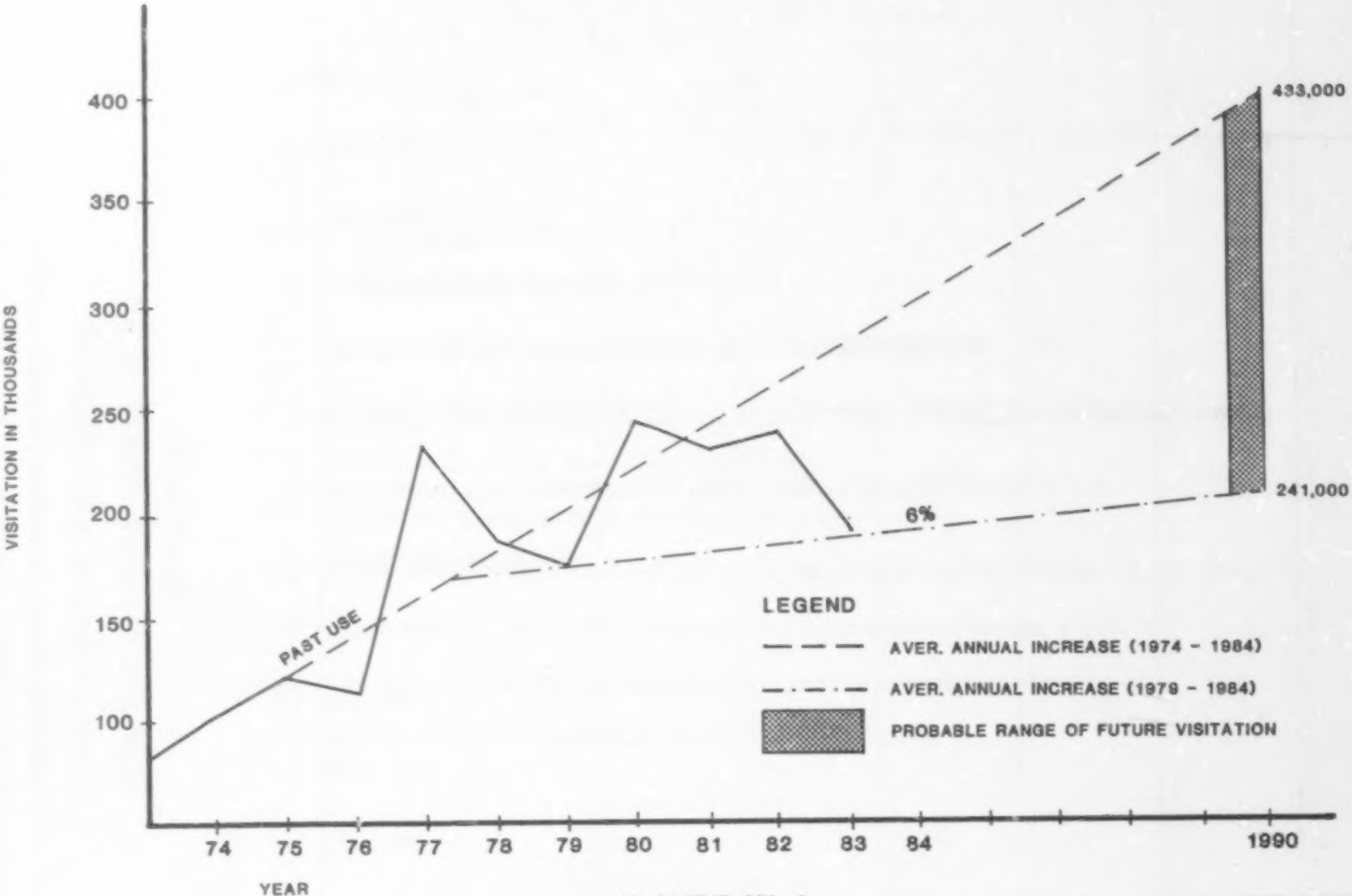


FIGURE III. 4

PROJECTED VISITATION TRENDS

DEVILS TOWER NATIONAL MONUMENT

UNITED STATES DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

REGIONAL LAND USE AND REGIONAL VISITOR FACILITIES AND SERVICES

The monument consists of 1,346.91 acres all federally owned in fee simple.

Crook County is a ranching region that hosts large numbers of hunters in the fall. This requires additional patrolling during hunting season. The county seat is Sundance (28 miles southeast, population 1,700). The other principal town is Moorcroft (33 miles southwest, population 981), which is also the nearest railhead. The nearest town is Hulett (11 miles, population 360).

The nearest Wyoming city is Gillette (62 miles, population 17,000). The nearest large city is Rapid City, South Dakota (105 miles southeast, population about 48,000). Rapid City is the best source of commercial air services with service by Western, United, and Republic Airlines.

Access to the monument is by State Highway 24 connecting with U.S. Highway 14. The nearest junctions with Interstate 90 are Moorcroft and Sundance.

Large deposits of subbituminous and bituminous coal are being mined (open pit) about 60 miles west of the monument. At this time, there are 10 operating mines--1 is the largest open-pit mine in the United States, with several more proposed. The largest air-cooled electric generating plant in the world went into operation 60 miles west in 1978 (300 MW). These developments have the potential to affect the air quality at Devils Tower.

Keyhole State Park is 20 miles southwest of the monument and is a popular recreation area.

A privately operated campground is adjacent to the eastern boundary of the monument.

FACILITY ANALYSIS

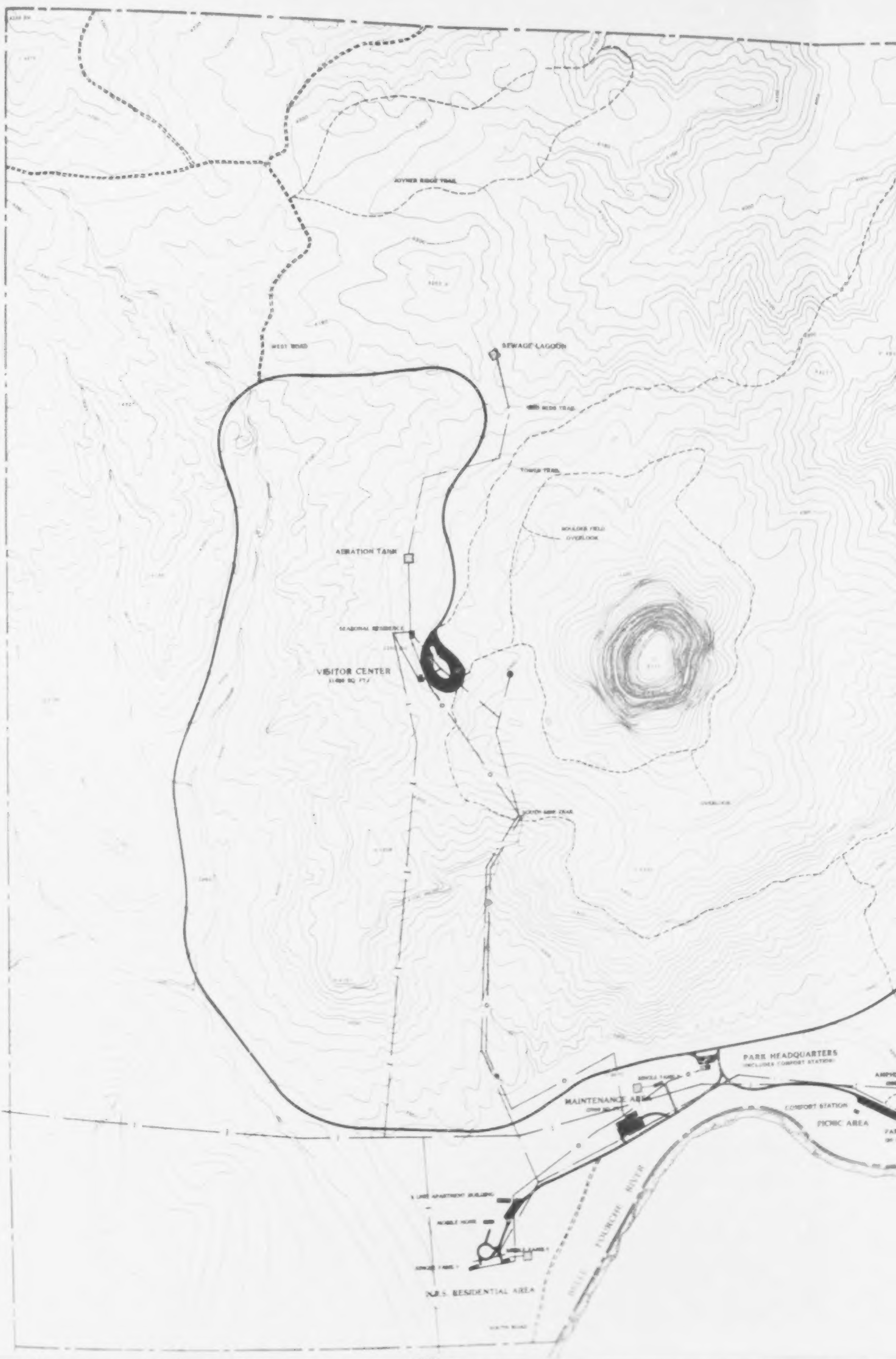
Nonhistoric roads and trails: There are 4.3 miles of graded roads and 6.0 miles of paved roads. The main park road running from the entrance to the visitor center is 3.0 miles long and has the following FHWA 1980 survey ratings: ADT-230, Structural Sufficiency Rating 56.3, Safety Sufficiency Rating 68.4. The roads in Devils Tower National Monument are in poor condition. There are 8 miles of trails in the park. The Tower Trail is 1.25 miles long and asphalt paved. The trail was paved in 1965. Although the trail is paved, it is not conducive to handicap use, there are portions of this trail that are extremely steep for wheel chairs and the path is variable in width which ranges from 4 feet wide to 2-1/2 feet wide. The asphalt has been seal coated; however, sand can be found along many portions of the trail and on steep slopes, which creates an unsafe condition. The trail is in need of realignment, widening, and repaving.

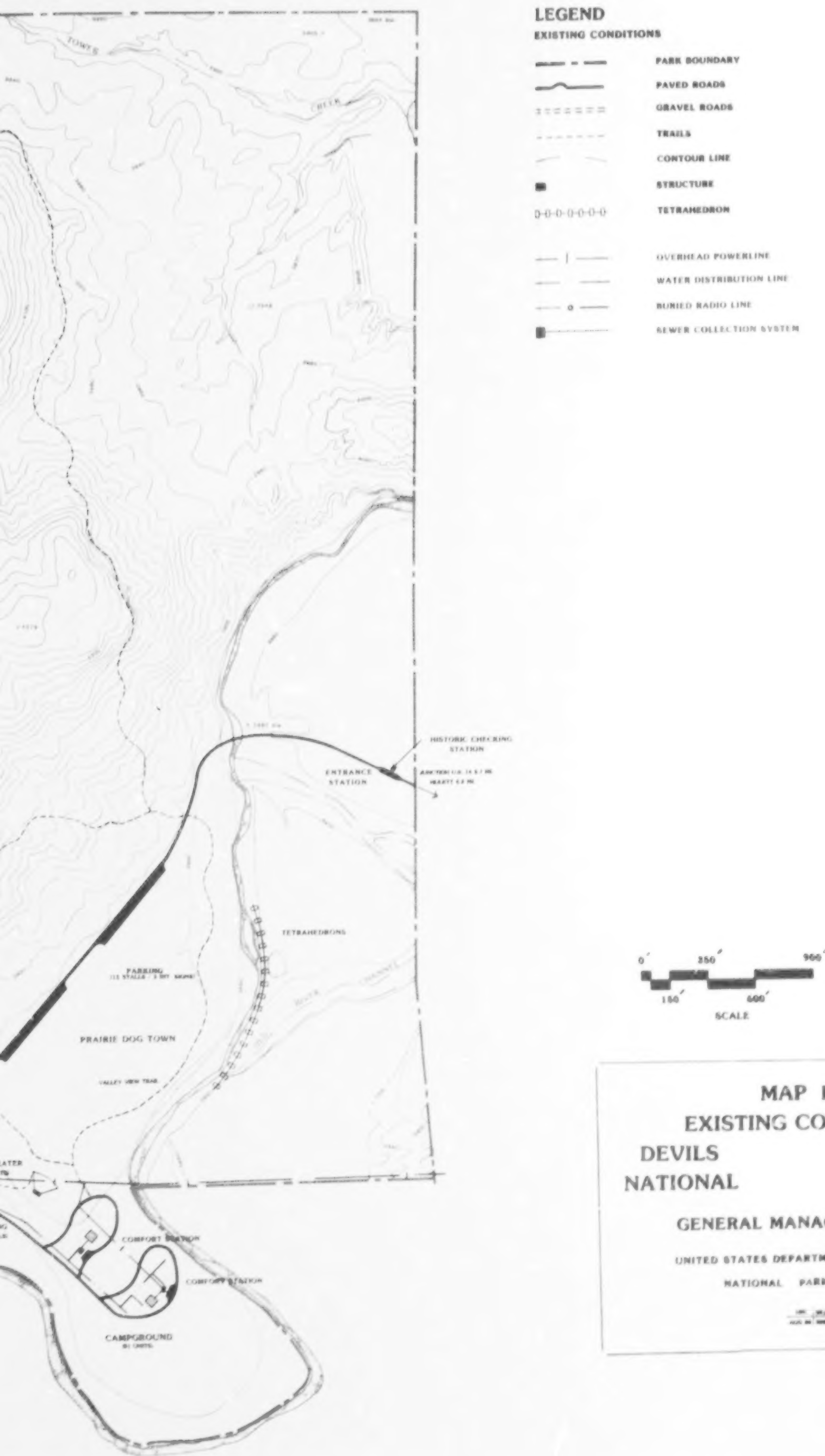
Nonhistoric buildings and facilities: There is a 51-site campground, a picnic area, an entrance station kiosk, 3 residences, a 6-unit seasonal apartment building, a maintenance shop, a small administration building, generator building, 2 hypochlorinator buildings, and an amphitheater. There are two comfort stations in the campground and one in the picnic area. No park structures are leased or rented to anyone except employees and the park does not rent or lease buildings from anyone else.

Utility systems: There is one water system with two reservoirs (one of 50,000 gallon capacity and one of 25,000 gallon capacity), a deep well (1,346 feet), and various pipelines. Over the past 10 years, this system has pumped a total of 27,159,400 gallons of water. The average total yearly usage is 2,715,940 gallons of which 25 percent is used by the visitor center and one residence; and 75 percent is used by a 51-site campground, 3 residences, a 6-unit apartment (seasonal), a maintenance building, and the Administration Building. There are eight sewage systems.

Historic Structures. There are six historic structures listed in the Resource Management Plan, Cultural Component, for Devils Tower. These are HS-1, the residence; HS-3, the visitor center; HS-4, the checking station; HS-13, the fire-hose shed; HS-19, the tetrahedrons (72); and HS-20, the historic ladder. See the completed Resource Management Plan, Cultural Component, for more details.

Major Equipment. Four vehicles are rented from General Services Administration on a yearly basis--one sedan, one station wagon, one 1/2-ton pickup, and one 3-yard dump truck. National Park Service owned equipment includes two cushman pickups; a new John Deere tractor with front end bucket; a 5-foot sickle bar mower; a hydraulic driven broom; and a rear blade. There is a 1969 3/4-ton pickup with a 200-gallon slip-on tank and pump for forest fire fighting. There is a 9.8-KW standby generator, a trailer mounted welder/generator, and shop equipment and tools.


JOYNER RIDGE TRAIL
WEST ROAD
SEWAGE LAGOON
RIDGE TRAIL
TOWER TRAIL
BOULDER FIELD
OVERLOOK
AERATION TANK
SEASONAL RESIDENCE
VISITOR CENTER
OVERLOOK
SOUTH SIDE TRAIL
PARK HEADQUARTERS
(INCLUDES COMFORT STATION)
MAINTENANCE AREA
COMFORT STATION
PICNIC AREA
BELLE FOURCHE RIVER
N.P.S. RESIDENTIAL AREA
MOBILE HOME
SOUTH ROAD



MAP III.2
EXISTING CONDITIONS
DEVILS TOWER NATIONAL MONUMENT

GENERAL MANAGEMENT PLAN

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSAL AND ALTERNATIVES

INTRODUCTION

This chapter contains the estimated effects of each alternative. This disclosure provides the information necessary to compare the relative merits of the alternatives and proposal.

NATURAL RESOURCE ENVIRONMENTAL CONSEQUENCES

Hydrology

In Alternative I, no changes in overall runoff patterns are anticipated. Siltation and erosion will continue on the sparsely vegetated slopes north of the main park road near the headquarters building. There is a remote possibility of loss of life and property in the campground in the event of a 100-year flood which would entirely engulf the campground area. Future flooding of the headquarters building is also a possibility in the event of a 500-year flood or failure of Keyhole Dam.

Short-term erosion and siltation of local drainages relating to the main park road will occur during the construction phase in Alternative II. Immediate revegetation of road cuts, fill, ditches, and other disturbed areas will minimize effects of erosion; hasten the stability of disturbed slopes; and improve the aesthetic appearance of the roadway. Paving of the campground amphitheater will result in increased runoff, which should be channeled away from the amphitheater periphery to minimize localized erosion.

In Alternative II, safety of visitors using the campground would be significantly increased during the remote possibility of a 100-year flood because sufficient warning would be given to campers to evacuate the floodplain area. In the event of dam failure, prior warning would provide park employees time to protect files and equipment in the headquarters building, warn visitors, and evacuate lower elevations.

In Alternative III, short-term localized erosion and siltation would occur from road reconstruction activities. Additional minor changes in local runoff patterns would result from expansion of the prairie dog parking, headquarters building expansion, and enlarged visitor center facilities.

For the National Park Service Proposal, hydrologic impacts are the same as those for Alternative III, with additional changes in local runoff patterns occurring in the vicinity of the new visitor center. Although the changes are relatively minor, they are located in the prime resource area of the park near the tower. Since this is the area of highest visitor concentration in the park, the net impact would be greater.

In Alternative IV, the large visitor contact/administrative complex will result in greater localized changes in runoff and drainage patterns than for the visitor center in Alternative III, but these will be well away from the prime resource area (the immediate surroundings of the tower) and thus will have a lesser overall impact on the tower. The new building should be constructed at an elevation sufficient to avoid flooding at the 100-year recurrence interval. This would necessitate building the structure on a pad sitting above the flood level.

In all alternatives, warnings of potential flooding hazards are provided at the campground. The upcoming Emergency Preparedness Plan, prepared by the Bureau of Reclamation should provide sufficient warning devises in the event of failure of Keyhole Dam. In this event, flood arrival time is long enough to give park staff time to warn visitors and evacuate the area.

In all alternatives, certificated water rights are sufficient.

Vegetation

Vegetation patterns and overall amounts of vegetative cover would remain virtually unchanged under Alternative I. However, increased visitation will result in greater pressure on vegetation in the immediate area of the existing visitor center. This will slow or halt ponderosa pine forest reproduction and probably cause damage to, or elimination of, other understory plants in this localized area.

In Alternative II, reconstruction of the main-park road will result in the removal of a total of 8.2 acres of ponderosa pine forest, shrub, and grassland vegetation, in the form of narrow strips averaging 10 to 15 feet in width on each side of the existing road. Much of this vegetation is regrowth from previously excavated drainage ditches. Immediately after road construction is completed, all disturbed areas should be reseeded with native species to hasten the return of vegetation to the newly excavated ditches, road cuts, and fills.

Minor alterations to vegetation will also occur from construction of a new comfort station near the visitor center and access improvements to the visitor center building in Alternative III. Vegetative cover north and east of the visitor center would be subject to increased future visitor pressure as described in Alternative I.

Impacts on vegetation for Alternative III are similar to those for Alternative II, but an additional 3/4 acre of natural vegetation will be removed for construction of additional parking at the Prairie Dog Town, expansion of the existing headquarters, expansion of the visitor center and related parking, widening of trails, and addition of a duplex unit in the employee residential area.

For the National Park Service Proposal, impacts on vegetation are similar to Alternative III for road, trail, and parking improvements, with an additional removal of 0.2 acres of forest vegetation for five new vehicle pullouts along the main park road. There may be additional, selected removal of ponderosa pine trees near the pullouts to enhance scenic views and picture taking of the tower. An estimated 0.7 acre of ponderosa pine forest would be permanently removed northeast of the current visitor center as the new visitor center and related parking are constructed bringing the total disturbed area, under this alternative, up to 8-1/2 acres. On a long-term basis, reduction of understory vegetation should be anticipated within a 500- to 1,000-foot radius of the new visitor center, and recovery of understory plants around the old visitor center and its related parking area should gradually occur.

In Alternative IV, overall impacts on vegetation will be less severe than for the National Park Service proposal since the new visitor center will be constructed away from the prime resource--the tower. Although the visitor center under this alternative will involve removal or alteration of about 25 percent more vegetation (approximately 1 acre), it will not be in a densely forested area. Visitor impacts on understory vegetation near the existing visitor center will diminish and will be limited to parking areas and trailheads.

Wildlife

The amount of area affected by development and use of Devils Tower National Monument remains similar to current conditions in all alternatives although intensities of use and development change. There is no measurable effect on habitat because little alteration of habitat components such as food and cover occurs over current levels.

Deer populations may be displaced during the heavy-use season--June, July, and August. Factors contributing to displacement are vehicle noise, presence of humans, and the intentional harassment of animals. During the hunting season, visitor use at the monument is low and displacement is minimal; therefore, the monument would continue to serve as a sanctuary for hunted populations. Effects of displacement on animals are short term, they include increased energy consumption, decreased energy intake, stress, behavioral modification, or a combination of these factors. Because effects are for short periods (3 months or less) and during low stress periods (summer months), no appreciable detrimental effects will occur. Because populations would be displaced to adjacent agricultural lands and these lands are not managed to insure the maintenance and welfare of that particular population, wildlife and other resource-use conflicts, habitat degradation, and intraspecific species competition may result. In some cases, if there is a conflict on private land resulting in damage claim, some or all of the population may be intentionally destroyed to resolve the conflict.

The previous discussion implies that displacement is a result of human activities; however, there are examples of big game populations being tolerant of human activity and development. Although not documented, this may be the case at Devils Tower National Monument.

All alternatives provide for boundary patrols during hunting season, this action minimizes potential poaching activities. Population stress is also minimized because use of the monument is low during the two most stressful periods (birthing and winter).

Some tower climbing routes are closed during the periods that prairie falcon are present; therefore, there will be no affect to these raptors. Programs are initiated to study and monitor other raptor populations in Alternatives III, IV, and the National Park Service Proposal.

Because surveys completed in the 1960's and 1970's did not identify presence of the black-footed ferret, there will be no affect on these species. The bald eagle seen within the monument do not nest in the area and are not dependent on its resources. Therefore, there will be no affect to the bald eagle.

Geology

No significant changes in the geologic environment are anticipated in Alternative I, except for continued minor degradation of unstable slopes of red mudstone and shale in the Gypsum Spring formation north of the main park road near the administration building. In the long term, increased visitation will result in some visitors not fully enjoying or appreciating the geologic significance of the monument because of overcrowded conditions. During higher periods of use, some visitors may not even be able to enjoy the monument's resources because of the lack of parking space, as has already happened occasionally in the past.

In Alternative I, increased use of the visitor center will result in continued and more widespread compaction of soils in the vicinity of the visitor center facilities. The most impacted area will be approximately 500- to 1,000-feet north and east of the visitor center building and parking lot. Presently, there are numerous involuntary trails and paths, particularly on the north and east sides of the parking lot in front of the visitor center building as people attempt to get varying views and pictures of the tower. Such activity is likely to increase as some visitors attempt to move away from concentrations of people around the visitor center. Increased soil compaction will eventually result in more runoff and erosion in this locality, as well as decreased understory plant populations, slowing or halting forest reproduction.

In Alternative II, reconstruction of the main park road will require excavation into virtually all of the sedimentary rock formations within the monument. Because the road follows drainages for most of its route, excavations will be minimized. However, it is possible that some excavations into massive sandstone may be required along an 850-foot section of the road where it crosses the Hulett Sandstone. Construction of the comfort station near the visitor center may involve excavation/blasting of rock, since large boulders of phonolyte porphyry commonly occur in the substrate in the visitor center vicinity.

As in Alternative I, increased visitation in the future will cause some visitors to turn away because of a lack of parking space, and overcrowding will make the visits of others less enjoyable resulting in less appreciation or enjoyment of the geologic significance of the monument under Alternative II. Soil compaction in the vicinity of the visitor center can be expected to become more widespread with resultant changes in drainage patterns, erosion, and decreases in vegetative cover.

In Alternative III, impacts on geology will be similar to those for Alternative II, but substantial enlargement of the visitor center and construction of new parking near the visitor center will likely involve some excavation problems as large boulders of tower rock (phonolyte porphyry) are certain to be encountered. After the visitor center improvements are made, it is probable that the localized impacts on soil compaction will increase slightly in the vicinity of the new parking area. However, under this alternative, it is less likely that visitors will experience overcrowding which would detract from the appreciation of the geologic significance of the monument, and fewer visitors are likely to turn away due to a lack of parking space.

In the National Park Service Proposal, impacts are the same as in Alternative III with the exception that major excavation work for the new visitor center and related parking would require the complete removal or blasting of large boulders of phonolyte porphyry. These are virtually certain to underlie at least portions of the proposed building/parking site.

Under Alternative V, impacts for roads, trails, and structures other than the visitor center are the same as for Alternative III. Construction of the visitor center near the entrance station will result in avoidance of the excavation problems anticipated in the National Park Service Proposal since the visitor center would be built over unconsolidated floodplain alluvium or stream terrace materials.

CULTURAL RESOURCE ENVIRONMENTAL CONSEQUENCES

Historical

A majority of environmental consequences related to historic structures are related to programs of protection and maintenance. A degree of protection is afforded by all alternatives. Exterior maintenance programs are employed in all alternatives. In Alternative III, Alternative IV, and the National Park Service Proposal, conditions necessary for establishing interior modifications for adaptive use, implementing a cyclic maintenance program for the historic ladder, and a program to nominate sites for the National Register of Historic Places are provided. All historic structures are maintained in all alternatives and the National Park Service Proposal.

If funding is available, conditions necessary to interpret the historic structures are provided in Alternative III, Alternative IV, and the National Park Service Proposal. This interpretation would facilitate public understanding and appreciation of the monuments historic values.

Archeological

Known archeological sites are not disturbed by construction activities in any alternative. Alternative II, Alternative III, Alternative IV, and the National Park Service Proposal provide conditions necessary to evaluate archeological sites for the National Register of Historic Places. All work performed would be in accordance with NPS-28.

Museum Collections

Alternative III, Alternative IV, and the National Park Service Proposal provide programs for museum collection and archival-library management resulting in improved collection, cataloguing, and storage of materials.

EFFECTS ON VISITOR USE

Annual visitation patterns--an average increase of 5 to 6 percent each year--are expected to remain the same in all alternatives. This pattern should continue because Devils Tower is not a destination area for a majority of users, but rather a "stop-over" area for visitors traveling to larger national parks (such as Yellowstone National Park).

In Alternatives I and II, the average length of stay should remain at the current length--about 1 hour. With increased services and facility capacities provided by Alternative III, the average length of stay should increase slightly--specific increase in unknown. Alternative IV and the National Park Service Proposal provide facilities and programs (such as larger visitor centers with increased exhibits and interpretation) that should result in lengthened stays averaging 2 hours. It is anticipated that visitors will take more time in understanding geology and resources of the monument, and a greater percentage of visitors will tour the improved Tower Trail.

Currently, facilities are not accessible to or usable by the physically handicapped. Under Alternative I, this condition will remain. Alternative II provides provisions for use at the visitor center and tower comfort station. In the National Park Service Proposal, Alternative III, and Alternative IV, facilities and the Tower Trail contain provisions for use by the disabled.

In Alternative IV and the National Park Service Proposal, visitor serviceability is enhanced because the headquarters is housed in conjunction with the visitor center. Under this concept, the visitor-contact facility would be open for public use year-round. Visitor services are enhanced in the National Park Service Proposal with improved interpretive and information distribution programs. Current visitor services are retained in Alternatives I, II, and III.

Patterns of use in the National Park Service Proposal and Alternatives I, II, and III would focus on the visitor center and tower-base facilities. Secondary focus is towards the Prairie Dog Town, picnic area, and campground. Alternative IV slightly modifies patterns of use. Major focus is towards tower-base facilities and the entrance visitor center; other use patterns are similar to the National Park Service Proposal.

Experience levels provided are similar in all alternatives. Opportunities for those desiring a structured and regulated environment are provided at developed areas such as the tower-base facilities, Prairie Dog Town, picnic area, and campground. Dispersed areas and trails provide opportunities for those desiring some isolation from the sight and sound of humans, independence, and a degree of self-reliance. Tower climbers desiring a challenging, but safe activity are provided for in all alternatives. Opportunities for photography are enhanced in the National Park Service Proposal, Alternative III, and Alternative IV with construction of photo pullouts along the main-park road.

Overnight use capacity remains the same in all alternatives--about 250 people at one time. Day-use capacities in Alternatives I and II are similar--about 50 people at one time at the Prairie Dog Town, 200 people at one time at the amphitheater, 70 people at one time at the picnic area, and 280 people at one time at the tower-base facilities. In the National Park Service Proposal, Alternative III, and Alternative IV, capacities are increased. The Prairie Dog Town could accommodate about 120 people at one time, the amphitheater 200 people at one time, and the picnic area 140 people at one time. Under the National Park Service Proposal, the tower-base facilities could accommodate about 550 people at one time. Tower base and visitor center capacity in Alternative III is about 480 people at one time and capacity in Alternative IV is about 1,000 people at one time.

EFFECTS ON REGIONAL LAND USE AND REGIONAL VISITOR FACILITIES AND SERVICES

All land within the national monument is federally owned in fee simple. This condition remains the same in all alternatives; therefore, there are no effects on landownership patterns. Because boundary expansion is not necessary and activities and visitation patterns would remain the same, there should be no effect on current land use and land use patterns. Private lands are adjacent to the national monument; access to these lands are provided by the monument's south and west roads. In the National Park Service Proposal, Alternative III, and Alternative IV, these roads are improved, therefore, improving conditions for landowner access. However, better road conditions may result in increased visitor use of these roads which could lead to increased trespass of adjacent private lands.

No increases in campground capacities are provided for in any alternative; therefore, there should be no adverse effects to the private campground located adjacent to the monuments eastern boundary.

Improvements provided in the National Park Service Proposal will contribute to slight increases in the construction workforce. Total development cost is estimated to be $2,436,000. Much of this money would be directly injected to State and local counties and communities. Development will only provide short-term construction employment.

No impacts to community stability, community services, or housing are anticipated.

EFFECT ON FACILITIES

Existing facilities are not designed or constructed to accommodate current levels of use. Because of budget and staffing constraints, the monument staff is only able to perform major maintenance a maximum of once a year. Minor maintenance is performed on a "real" need basis. Consequently, facilities look "well-worn" at the end of each use season. Under Alternatives I and II this condition continues. In Alternative III, Alternative IV, and the National Park Service Proposal, major visitor-use facilities (comfort station and visitor center) are reconstructed or expanded. These facilities use lower maintenance and longer wearing material; therefore, maintenance needs are reduced.

Because of design and materials used in construction, existing facilities are difficult to clean requiring a substantial investment. In Alternatives I and II, this condition continues. Major visitor-use facilities are reconstructed or new ones are built in Alternative III, Alternative IV, and the National Park Service Proposal. Therefore, a savings in clean-up time is realized.

The existing visitor center is closed to public use during the the off-season because of the difficulty and expense of heating compared to low visitation during these periods of the year. In Alternatives I, II, and III, this condition continues. In Alternative IV and the National Park Service Proposal, the visitor center and monument headquarters are housed in the same building. This strategy allows visitor contact facilities to be open year-round. Energy efficient design reduces heating expenses. Better visitation contact and services are also realized during the off season of use.

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to nonrenewable resources, such as cultural resources, or to those factors which are renewable only over long-time spans, such as soil productivity. Irreversible also includes loss of future options.

Irretrievable commitment applies to losses associated with production or use of renewable natural resources. For example, short-term losses of primitive recreation opportunities while developments are in place. If the developments are eliminated in the future, primitive recreation could be restored; therefore, primitive opportunities lost while developments are in place are irretrievable, but not irreversible.

Irreversible commitments associated with this proposal are:

Materials used in construction/reconstruction of roads, trails, utility systems, buildings, and other facilities

Potential loss of cultural resource sites, areas, or values

Loss of soil productivity.

Irretrievable commitments associated with this proposal are:

Deterioration of air quality over natural levels during heavy visitor-use periods

Loss of some existing vegetation.

THE RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE, AND ENHANCEMENT OF THE LONG-TERM PRODUCTIVITY

The purpose of Devils Tower National Monument is to preserve the tower and its associated resources while providing for public use and enjoyment.

This potential conflict between use of the monument and conservation of natural values requires that some tradeoffs be made and that recreational activities within the monument be carefully and thoroughly managed. Thus, through good planning and management practices, use of the monument's natural environment can become a long-term preservation of the environment rather than a short-term consumptive use of the local resources.

The General Management Plan for Devils Tower National Monument provides a framework to improve management and visitor service. Past experience indicates current facilities and management are inadequate during the peak-use season if resources are to be preserved. The general management plan provides facilities and management to preserve resources and accommodate visitor use. Because management controls the use, adverse environmental effects are mitigated enhancing long-term recreational and resource productivity.

best copy available

FIGURE IV.1

SUMMARY COMPARISON OF ENVIRONMENTAL CONSEQUENCES

ELEMENT	ALTERNATIVE				
	I	II	III	IV	NPS PROPOSAL
HYDROLOGY	Campground within 100-year flood plain. Siltation and erosion continues on sparsely vegetated sufficient. Certified water rights sufficient.	Campground within 100-year flood plain. Short term siltation and erosion from road reconstruction. Campground visitors safety increased through flood potential warnings. Certificated water rights sufficient.	Campground within 100-year flood plain. Short term siltation and erosion from road reconstruction, parking expansion, and other improvements. Slight change in runoff patterns from increased paving. Certified water rights sufficient.	Campground and visitor contact parking in 100-year flood plain. Greater localized dangers in runoff and drainage pattern due to new location of visitor facility. But location is away from the primary resource the tower itself which lessens overall impacts. Certified water rights sufficient.	Campground within 100-year flood plain. Siltation, erosion, and runoff patterns similar to alternative III. However, impact greater because of vicinity of impacts to primary resource, the tower itself. Certified water rights sufficient.
VEGETATION	Vegetation patterns and covers remain unchanged. Slowed reproduction of ponderosa pine near visitors center.	Removal of 7.4 acres of ponderosa pine, shrub, and grassland vegetation. Slowed reproduction of Ponderosa Pine near visitors center.	Approximate removal of 8.2 acres of ponderosa pine, shrub, grassland, and vegetation.	Removal of 9.4 acres of vegetation. Most vegetation removed is grassland associated with new visitor contact/administrative facility.	Removal of 8.4 acres of ponderosa pine, shrub, and grassland vegetation. .7 acres of ponderosa pine permanently removed by new visitor contact facility and parking.
WILDLIFE	No change from present levels. No affect to T&E species.	No change from present levels. No affect to T&E species.	No change from present levels. No affect to T&E species.	No change from present levels. No affect to T&E species.	No change from present levels. No affect to T&E species.
GEOLOGY	No change to geologic environment. Increased compaction of soils near visitors center.	Excavation of sedimentary rock formations. Increased compaction of soil compaction near visitor center.	Possible excavation problems with visitor center expansion. Slight increase in soil compaction near visitor center.	Excavation of sedimentary rock formations from road construction. Avoidance of excavation problems associated with NPS proposal.	Complete removal of large boulders of phonolite.
HISTORIC	No change to historic structures.	Provision for national register nomination. No change to historic structures.	Interior modifications of buildings for adaptive use. Provision for National Register nomination. Historic structures interpreted. Facilities for museum collection and archival manuscript.	Interior modifications of buildings for adaptive use. Provision for National Register nomination. Historic structures interpreted. Facilities for museum collection and archival management.	Inter modifications of buildings for adaptive use. Provision for national register nomination. Historic structures interpreted. Facilities for museum collection and archival management.
ARCHEOLOGIC	No effect to known sites.	No effect to known sites. Provisions for national register evaluation.	No effect to known sites. Provisions for national register evaluation.	No effect to known sites. Provisions for national register evaluation.	Provisions for national register evaluation.
	No effect to known sites.	No effect to known sites. Provisions for national register evaluation.	No effect to known sites. Provisions for national register evaluation.	No effect to known sites. Provisions for national register evaluation.	No effect to known sites. Provisions for national register evaluation.
VISITOR USE	Visitation increase of 5-6% each year. Average length of stay 1 hour. Not accessible to physically disabled. Visitor center closed October to May. Use patterns focused to tower base. Persons at one time day use capacity 600. Persons at one time overnight capacity 250.	Visitation increase of 5-6% each year. Average length of stay 1 hour. Provisions for handicap use of comfort facilities and visitor center at tower base. Visitor center closed October to May. Use patterns focused to tower base. Persons at one time day use capacity 600. Persons at one time overnight capacity 250.	Visitation increase 506% each year. Slight increase in average length of stay. Provisions for handicap use of comfort facilities and visitors center at tower base. Provision for handicap use of Tower Trail. Visitor center closed October to May. Improved interpretive information distribution programs. Opportunities for photography enhanced. Persons at one time capacity day use 940. Overnight capacity, persons at one time 250.	Visitation increase of 5-6% each year. Slight increase in average length of stay. Provisions	
FACILITIES	Facilities appear well worn. Waste water flow gals/day: 19,930. Potable water demands gals/day: 29,000.	Facilities appear well worn. Waste water flow gals/day: 20,530. Potable water demands gals/day: 29,600.	Reduced daily maintenance and cleanup work. Reduced time expenditure per structure. Reduced annual road maintenance costs. Waste water flow gals/day: 25,850. Potable water demands gals/day: 38,900.	Reduced daily maintenance cleanup work. Reduced time expenditure per structure. Reduced annual road maintenance costs. Waste water flow gals/day: 36,950. Potable water demands gals/day: 51,100.	Reduced daily maintenance and cleanup work. Reduced time expenditure per structure. Reduced annual road maintenanc costs. Waste water flow gals/day: 35,956. Potable water demands gals/day 49,900.

CHAPTER V

LIST OF PREPARERS

This Environmental Assessment/General Management Plan/ Development Concept Plan was prepared by the Interdisciplinary Team of Devils Tower National Monument and Rocky Mountain Regional Office. The team members are as follows.

David Reeser, Civil Engineer, Rocky Mountain Regional Office

Homer Robinson, Superintendent, Devils Tower National Monument

Dr. Ralph Root, Geologist, Denver Service Center

Michael Snyder, Team Captain/Landscape Architect/Planner, Rocky Mountain Regional Office

Others who were active in the preparation of this environmental assessment are:

Sarah Brown, Landscape Architect Technician, Rocky Mountain Regional Office

Brent Fults, Landscape Architect Technician, Rocky Mountain Regional Office

Joyce Moe, Editorial Clerk, Rocky Mountain Regional Office

CHAPTER VI

CONSULTATION

Dr. Ann Johnson, Archeologist, Rocky Mountain Regional Office

Ronald Hermance, Hydrologist, Rocky Mountain Regional Office

Rodd Wheaton, Regional Historic Architect, Rocky Mountain Regional Office

Greg L. Kerr, Wyoming Water Research Center, University of Wyoming

Richard Altstadt, Corp of Engineers, Omaha District

U.S. Fish and Wildlife Service

Wyoming Recreation Commission

Wyoming State Historic Preservation Office

Campbell County Chamber of Commerce

Wyoming Game and Fish Department

Wyoming State Engineers Office

Black Hills, Badlands, and Lakes Associates of South Dakota

National Park Service, Water Resources Branch, Fort Collins, Colorado

25. Devils Tower National Monument

Establishment: Proclamation (No. 658) of September 24, 1906 Page 171

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 658—Sept. 24, 1906—34 Stat. 3236]

WHEREAS, It is provided by section two of the Act of Congress, approved June 8, 1906, entitled, "An Act for the preservation of American Antiquities," "That the President of the United States is hereby authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be National Monuments, and may reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the object to be protected;"

AND, WHEREAS, the lofty and isolated rock in the State of Wyoming, known as the "Devils Tower," situated upon the public lands owned and controlled by the United States is such an extraordinary example of the effect of erosion in the higher mountains as to be a natural wonder and an object of historic and great scientific interest and it appears that the public good would be promoted by reserving this tower as a National monument with as much land as may be necessary for the proper protection thereof;

NOW, THEREFORE, I, Theodore Roosevelt, President of the United States of America, by virtue of the power in me vested by section two of the aforesaid Act of Congress, do hereby set aside as the Devils Tower National Monument, the lofty and isolated rock situated in Crook County, Wyoming, more particularly located and described as follows, towit:

Section seven, and the north half of the northeast quarter, the northeast quarter of the northwest quarter and lot number one of section eighteen, in township fifty-three north, range sixty-five; the east half of section twelve and the north half of the northeast quarter of section thirteen in township fifty-three north, range sixty-six, all west of the Sixth Principal Meridian, as shown upon the map hereto attached and made a part of this proclamation.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure or destroy any feature of the natural tower hereby declared to be a National monument or to locate or settle upon any of the lands reserved and made a part of said monument by this proclamation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixt.

DONE at the City of Washington, this 24th day of September, in the year of our Lord one thousand nine hundred and six and of the Independence of the United States the one hundred and thirty-first.

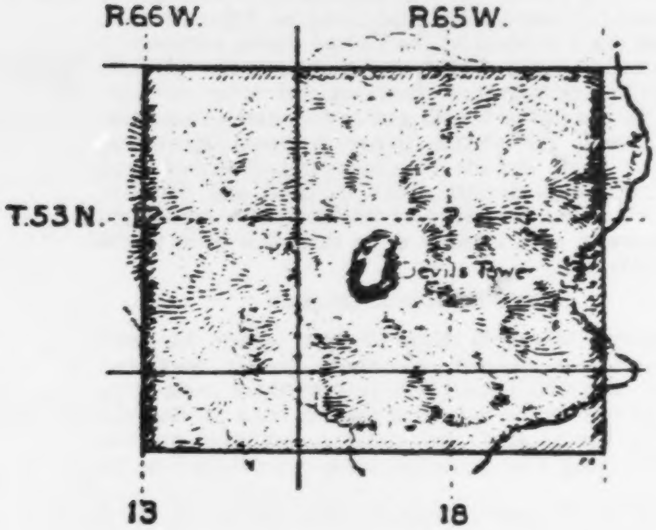
[SEAL]

THEODORE ROOSEVELT.

By the President:
ALVEY A. ADEE,
Acting Secretary of State.

DEVILS TOWER
NATIONAL MONUMENT

Embracing Sec 7 and the N½ of NE¼, the
NE¼ of NW¼ and lot No. 1 of Sec. 18 in T. 53 N.,
R. 65; the E½ of Sec. 12 and the N½ of NE¼
of Sec. 13 in T. 53 N., R 66 all West of the
6th Principal Meridian,
WYOMING.
Containing 1152.91 acres



DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE,
W.A.Richards, Commissioner.

[MAP ATTACHED TO AND MADE A PART OF THE PROCLAMATION
DATED SEPTEMBER 24, 1906.]

11. Devils Tower National Monument

Page
Addition of land to monument authorized in recognition of fiftieth anniversary of establishment; land exchanges authorized ---------------- Act of August 9, 1955 405

An Act To provide recognition of the fiftieth anniversary of the Devils Tower National Monument, Wyoming, the first national monument, established by the President of the United States pursuant to the Antiquities Act of 1906; to authorize the addition of certain land to the monument, to permit land exchanges, and for other purposes, approved August 9, 1955 (69 Stat. 575)

Devils Tower National Monument.

34 Stat. 225. 16 U.S.C. 431-433.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in recognition of the fiftieth anniversary of the Devils Tower National Monument, Wyoming, the first national monument, established on September 24, 1906, by the President of the United States pursuant to the Antiquities Act of 1906, and in order to provide suitable public campground facilities and other developments for the public benefit and to facilitate administration thereof, the Devils Tower National Monument hereafter shall include the following described land comprising approximately one hundred and fifty-five acres, which the Secretary of the Interior is authorized to procure in such manner as he shall find to be in the public interest:

SIXTH PRINCIPAL MERIDIAN

Township 53 north, range 65 west, section 18, south half northeast quarter, southeast quarter northwest quarter, north half southeast quarter, those parts lying north of and within a loop of the left bank of the Belle Fourche River; southwest quarter northwest quarter, that part lying west of the left bank of the Belle Fourche River;

Township 53 north, range 66 west, section 13, south half northeast quarter.

Sec. 2. For land exchange purposes, the Secretary of the Interior is authorized to accept title to any land or interests therein situated within the area added to the national monument by this Act, and, in exchange for land or interests therein so accepted, to convey any national monument land or interests therein of approximately equal value situated in the northeast quarter of section 18, township 53 north, range 65 west, and lying east of the Belle Fourche River. National monument lands so conveyed for exchange purposes shall be excluded from the national monument. (16 U.S.C. § 431 note.)

APPENDIX B

DEVELOPMENT COST ESTIMATES

ALTERNATIVE I

Expand septic tanks and leach fields	$ 14,000.00
Total	$ 14,000.00

ALTERNATIVE II

Pave amphitheater	$ 7,000.00
Improve visitor center entrance	$ 5,000.00
New tower base comfort station	$115,000.00
National Park Service duplex	$210,000.00
Sewer treatment expansion	$ 14,000.00
Total	$351,000.00

ALTERNATIVE III

Chip and seal south and west roads	$ 34,000.00
Expand Prairie Dog Town parking	$ 43,000.00
Expand headquarters by 600 square feet	$ 232,000.00
Expand picnic area parking	$ 43,000.00
Pave amphitheater	$ 7,000.00
New 20-stall bus/RV parking	$ 132,000.00
New tower base comfort station	$ 115,000.00
Expand visitor center by 2,500 square feet	$ 794,000.00
Improve Tower Trail	$ 28,000.00
National Park Service duplex	$ 210,000.00
Sewage Treatment Expansion	$ 20,000.00
Water storage and distribution expansion	$ 48,000.00
Total	$1,658,000.00

ALTERNATIVE IV

Pave south and west roads	$ 543,000.00
Construct five photo pullouts	$ 58,000.00
Expand Prairie Dog Town parking	$ 43,000.00
Expand Prairie Dog Town interpretive signs	$ 4,000.00
Convert headquarters to residences	$ 30,000.00
Expand picnic area parking	$ 43,000.00
Pave amphitheater	$ 7,000.00
Convert visitor center to Ranger Station with comfort station	$ 48,000.00
Improve Tower Trail	$ 54,000.00
Visitor/administrative facility (11,500 square feet)	$3,147,000.00
30-stall bus/RV parking	$ 184,000.00
200-stall single-vehicle parking	$ 355,000.00
2-stall vehicle covered storage	$ 56,000.00
1,000-square-foot warehouse expansion	$ 186,000.00
National Park Service Duplex	$ 210,000.00
Sewage treatment expansion	$ 109,000.00
Water storage and distribution	$ 204,000.00
Total	$5,281,000.00

APPENDIX C

SPECIAL FLOOD HAZARD REPORT
DEVILS TOWER NATIONAL MONUMENT
DEVILS TOWER, WYOMING

PREPARED FOR

NATIONAL PARK SERVICE
DIVISION OF PARK PLANNING
ROCKY MOUNTAIN REGIONAL OFFICE

JULY 1985

U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT
OMAHA, NEBRASKA

SPECIAL FLOOD HAZARD REPORT
DEVILS TOWER NATIONAL MONUMENT, WYOMING

INTRODUCTION

This report was prepared for the National Park Service (NPS), Division of Park Planning, Rocky Mountain Regional Office.

The purpose of this study was to develop flood plain information on the Belle Fourche River within the Devils Tower National Monument. This information will assist the NPS with flood plain management and the preparation of a Devils Tower General Management Plan.

AUTHORITY AND ACKNOWLEDGEMENTS

This Special Flood Hazard Report for Devils Tower National Monument was prepared by the Omaha District, Corps of Engineers, under continuing authority provided by Section 206 of the Flood Control Act of 1960 (Public Law 86-645), as amended.

AREA STUDIED

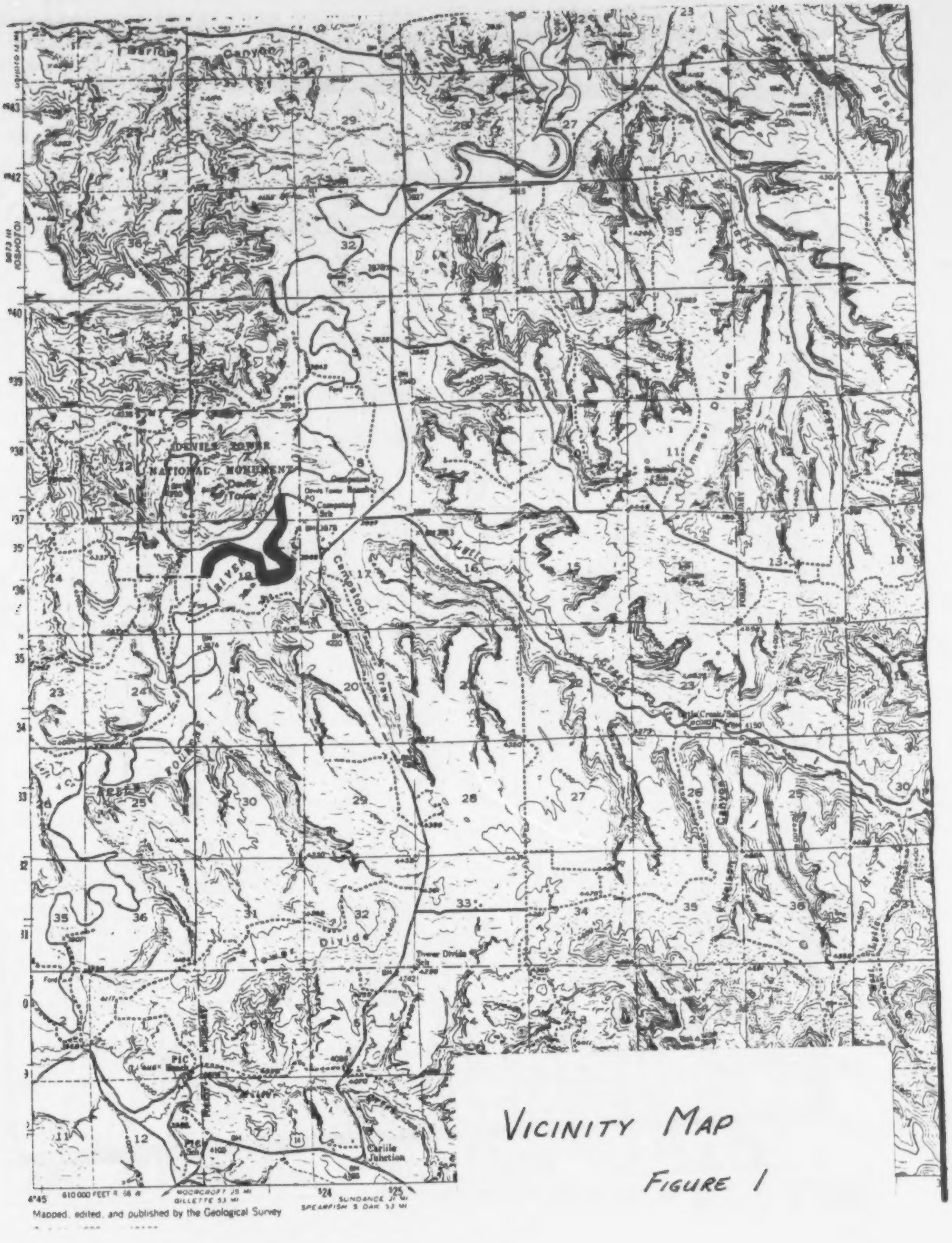
Scope of Study

This Special Flood Hazard Report covers an area within the Devils Tower National Monument along the Belle Fourche River. The study area started 800 feet upstream of the Belle Fourche River bridge inside the Park and extended to the south Park boundary, a distance of approximately 2.0 miles. The area of study is shown on the Vicinity Maps (Figures 1 and 2).

The Belle Fourche River is a left bank tributary of the Cheyenne River. Its drainage basin is located in northeastern Wyoming and west central South Dakota. Flowing in a northeasterly direction from its headwaters 40 miles south of Gillette, Wyoming, the Belle Fourche River flows into Keyhole Reservoir located near Moorcroft, Wyoming. From Keyhole Reservoir and Dam, the Belle Fourche River continues its flow in a northerly direction for approximately 17.8 miles to the Devils Tower National Monument.

Source of Data

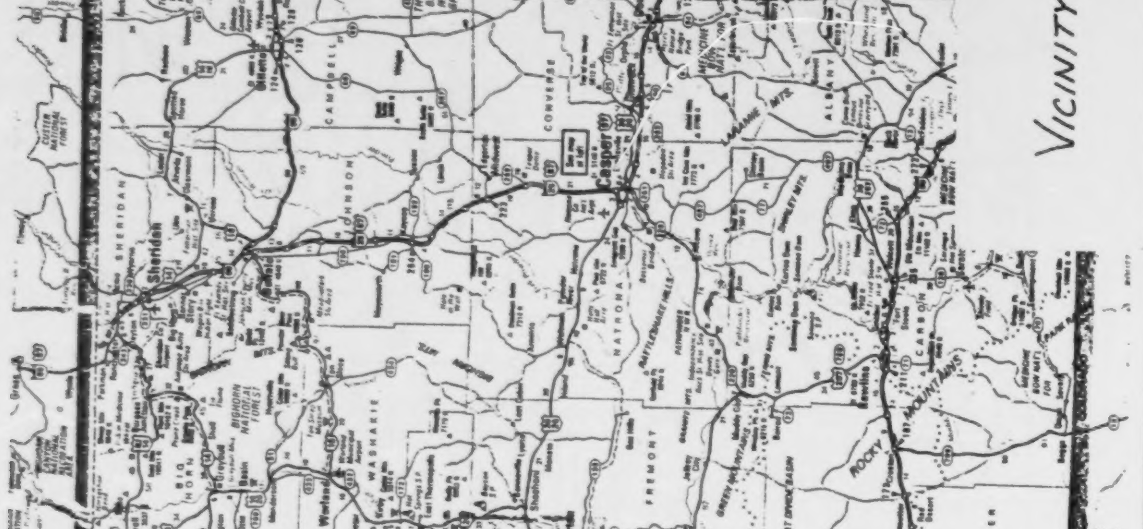
Eight (8) cross-sections were surveyed in June 1984 on the Belle Fourche River inside the park. The location of each cross-section was specified by the NPS. The surveying was performed by the Wyoming Water Research Center of the University of Wyoming at Laramie (Reference 1).



Mapped, edited, and published by the Geological Survey

VICINITY MAP

FIGURE 1



Wyoming Travel Commission, Frank Norris Jr., Travel Cons

VICINITY MAP

FIGURE 2

Cross-sections were measured perpendicular to the flow of the river. Elevations were taken through the main river section at a maximum spacing of 10 ft and at all abrupt changes in slope. The water surface elevation at each cross-section at the time of survey was noted. The ground elevations outside the main river bank were taken at approximately every 100 ft along the section line and at intermediate points where abrupt changes occurred. Where the topography was uniformly sloped, the spacings for section elevations were at a maximum of 200 ft.

EXISTING FLOOD CONTROL STRUCTURES

Keyhole Dam is the only major structure that significantly affects flows on the Belle Fourche River at the Devils Tower study area. Keyhole Dam and Reservoir is a U.S. Bureau of Reclamation project completed in 1952. The primary purposes of the Reservoir are to provide storage space for irrigation water and flood protection along the Belle Fourche River in Wyoming and South Dakota. At conservation pool elevation 4,099.3 mean sea level (m.s.l.), the Reservoir has a surface area of 9,344 acres. Flood control storage, elevation 4,099.3 to 4111.5 m.s.l., available in Keyhole Reservoir is 140,000 acre feet.

ENGINEERING METHODS

Floods having recurrence intervals of 10-, 50-, 100-, and 500-years have significance for flood plain management. Because of this, these floods on the Belle Fourche River were selected for study.

Also studied were potential flood levels at the National Monument from the Belle Fourche River that could result from failure of Keyhole Dam, located 17.8 miles upstream of the study area.

Hydrologic Analyses

Since streamflow data were not available for the Belle Fourche River at Devils Tower National Monument, discharge-probability relationships were developed using a regional flow frequency method developed by the U.S. Geological Survey (U.S.G.S.). Statistical analyses of streamflow records were made at two Belle Fourche River locations and three tributary locations for purposes of comparison.

The frequency curve developed for the Devils Tower site was based on criteria presented in a U.S.G.S. publication entitled, "Techniques for Estimating Flow Characteristics of Wyoming Streams", dated November 1976. Regional equations selected from this publication for the 100-, 50-, 25-, 10-, 5-, and 2-year flood frequencies were used with the 640 square mile drainage area (Keyhole Dam to Devils Tower) to obtain the respective discharges. These discharges were plotted and a line drawn through the points. Adjustments for partial duration series using Langbein's method and expected probability using an average period of record of 18 years were made to complete the final curve. It is presented on Attachment 1. An extrapolation of this frequency curve was used to determine the 500-year discharge for the Belle Fourche River at Devils Tower.

A dam breach model for Keyhole Dam has been developed by the Bureau of Reclamation. The model was developed using the National Weather Service Dam Break Flood Forecasting Model. Information was developed for the failure of Keyhole Dam at the Devils Tower National Monument Park entrance. The maximum flood elevation was determined to be 3,885 feet (see attachment 2) and the flood arrival time at Devils Towet was estimated to be 3 hours. The travel time was measured from the start of the breach until the flood reached the park entrance. For additional information, refer to the Bureau of Reclamation's report "Dam Failure Inundation Study of Keyhole Dam, Wyoming" (Reference 2).

Hydraulic Analyses

Analyses of the hydraulic characteristics of the Belle Fourche River were carried out to provide estimates of the water surface elevations of floods for the selected recurrence intervals.

Water-surface elevations were computed through the use of the U.S. Army Corps of Engineers HEC-2 standard step-backwater computer program. Locations of selected cross-sections used in the hydraulic analysis are shown on the Flood Boundary Map (Attachment 2).

Channel roughness factors (manning's "n") for these computations were assigned on the basis of field inspection, aerial and surface photograph of the flood plain areas, as well as comparisons to other studies along the Belle Fourche River.

The following is a tabulation of the roughness values used for manning's "n":

	Channel	Overbanks
Belle Fourche River	0.030 to 0.040	0.060

Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water surface elevations for the Belle Fourche River were determined by normal depth and by comparison to existing values taken at the Belle Fourche River bridge inside the Park. High water marks were not available; however, some information was available at the access road bridge for the 50-year and 100-year floods. Discharges were estimated for this location during the design of the new access road bridge to the park. This information was helpful in determining starting water surface elevations. All elevations are measured from m.s.l. Table 1 and Attachment 3 show water surface elevations at each cross-section for floods of the selected recurrence intervals.

Flood Boundaries

The flood boundaries for the 100-year and 500-year floods have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using USGS 15-minute topographic maps at a scale of 1:62500 with a contour interval of 40 feet. Also shown on the Flood Boundary Map is the delineation of the dam failure flood for Keyhole Dam. The Flood Boundary Map for this study is shown on Attachment 3.

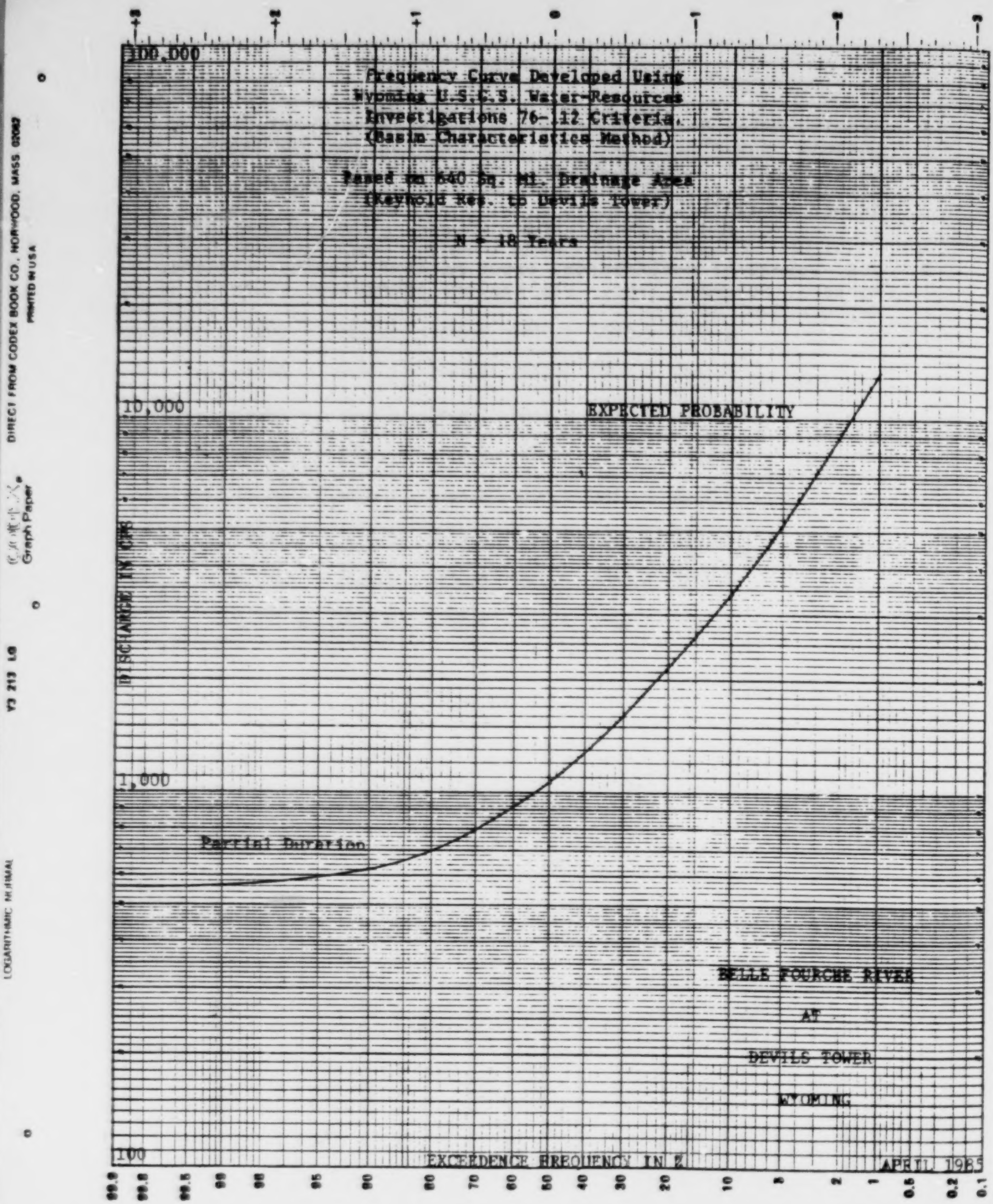
TABLE 1
Flood Data - Belle Fourche River

			Water Surface Elevation			
Cross Section	Stream Station	Stream Bed Elev	10-Yr Flood	50-Yr Flood	100-Yr Flood	500-Yr Flood
Access Road to Monument	1000	3837.1	3846.0	3849.9	3851.8	3856.2
1	1820	3838.2	3847.6	3851.6	3853.6	3858.1
2	3060	3842.5	3849.7	3853.7	3855.8	3860.4
4	5900	3844.4	3853.3	3857.5	3859.0	3862.5
5	7820	3846.7	3855.2	3860.1	3861.5	3864.0
6	9280	3846.9	3856.8	3861.2	3862.6	3865.7
7	10,080	3848.5	3857.8	3861.9	3863.2	3866.5
8	10,720	3850.8	3858.4	3862.4	3863.8	3867.2

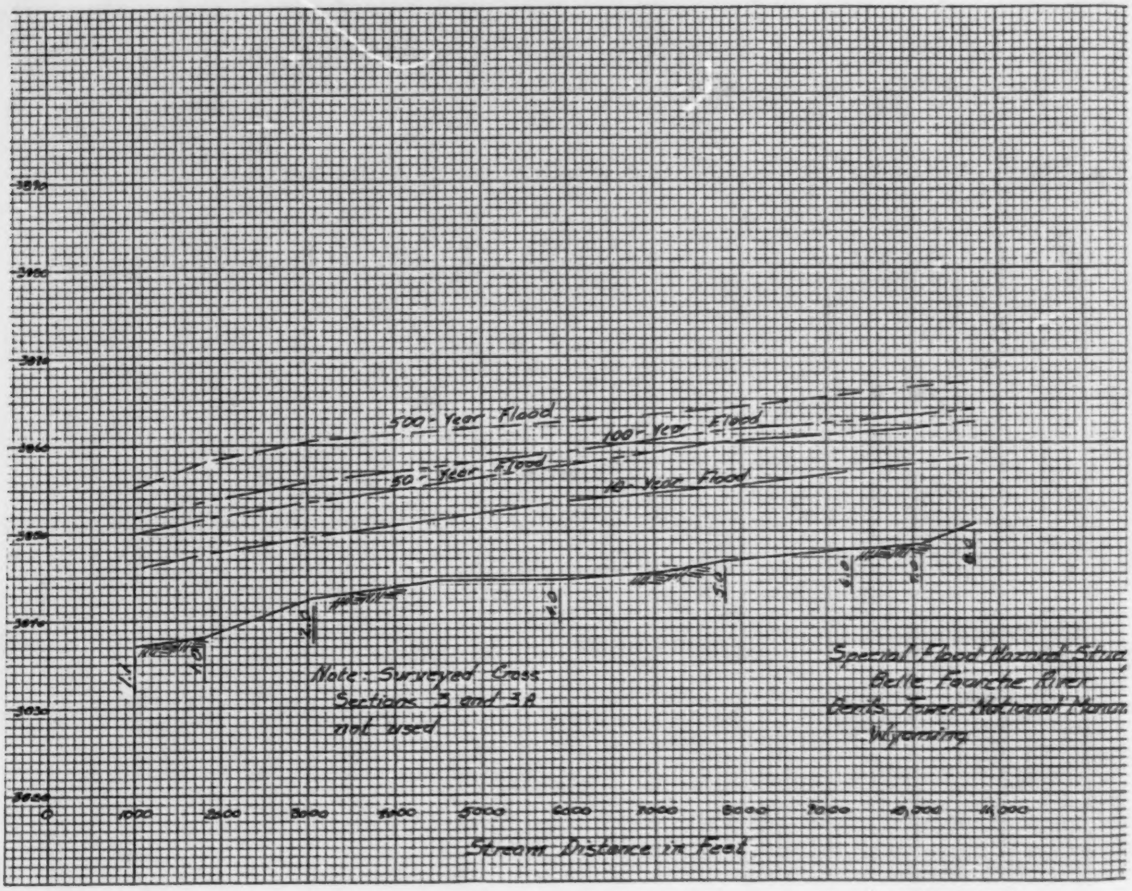
REFERENCES

1. Wyoming Water Research Center, University of Wyoming at Laramie, November 1984. Devils Tower National Monument flood plain cross-sections of Belle Fourche River. Report prepared for the National Park Service under Contract Number CX-1200-4-A050.

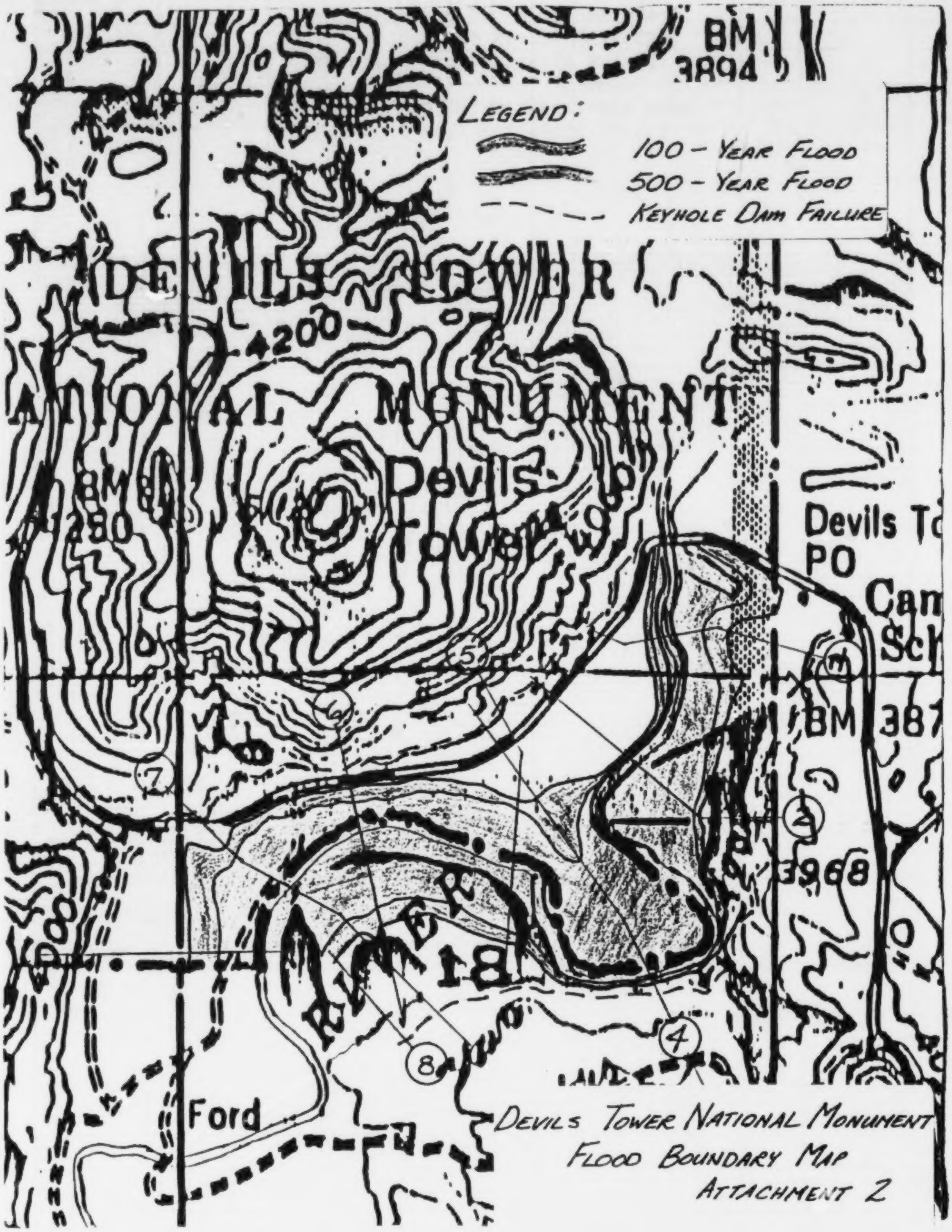
2. U.S. Bureau of Reclamation, Upper Missouri Region, Billings, Montana, November 1984. Dam failure inundation study of Keyhole Dam, Wyoming.



Attachment 1



Attachment 3



DEVILS TOWER NATIONAL MONUMENT
FLOOD BOUNDARY MAP
ATTACHMENT 2

*U.S. GOVERNMENT PRINTING OFFICE: 1985-0-676-610/45031